FOOD MANUFACTURE

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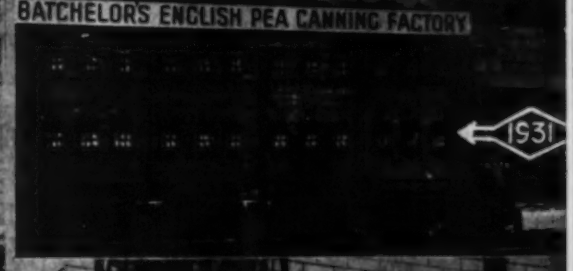

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FOOD MANUFACTURE

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FOOD MANUFACTURE

Vol. XII, No. 10 October, 1937

Food and War

A NOTE in this issue shedding a sidelight on the possibilities of food poisoning by poison gases adds still another terror to the effects of war. If, and when, storage of food, whether canned or otherwise, becomes a standard precaution against possible war conditions, the possibility of food stores being contaminated by gas must not be lost sight of.

There has been a lot of talk about dumps of canned foods and no doubt certain fundamental requirements have been realized. The usual foodstuff can used in this country is not lacquered externally; therefore if the humidity conditions in the storehouse were not ideal the can would be covered with a good deposit of iron oxide in a very short time. On the other hand, the cost of automatic humidity control of such storehouses would be prohibitive.

Due attention should be paid to incubation of the cans. Leaky and blown cans occur from time to time despite the most careful precautions, and although no very serious consequences would be likely to accrue from the dissemination in the store of the material issuing from burst cans, the atmosphere of the dump would at least be far from fragrant.

Cans would have to be identified by stamped or coded markings on the cans themselves, as labels would be likely to fade, tear or rub off. However, there would seem to be plenty of time to consider these details, as nobody seems to be moving in the matter of food storage.

Bacon Pigs

Mr. Morrison has caused a lot of disappointment by his recent statement on bacon pigs and the fact that he is unable to announce at once some definite proposals for the reorganisation of the pigs marketing scheme to give an immediate prospect of settled prices for producers. The Minister pointed out two causes of the breakdown of the marketing scheme. These—which have frequently been mentioned in these columns—are the increase in feeding costs without any commensurate rise in bacon pig prices and the inefficiency of many of the smaller bacon factories. He said that "the Government believe that if the industry were founded on a small number of efficient factories provided with adequate and regular supplies of pigs of good quality and conformation, sufficient economies could be secured in the cost of curing to enable the industry to be maintained during periods of high feeding costs". That is what most of us believe. We don't need Mr. Morrison to tell us about the rank inefficiency of our system of bacon factories—that is obvious to the meanest intelligence. What we want is a reform of the system and a complete reorganisation of the curing mechanism. That is what the Government should do as soon as possible, in the meantime maintaining the industry by regulated imports and a levy subsidy.

The Bakers' Exhibition

The annual exhibition of the Confectioners, Bakers and Allied Traders once more has been staged in the familiar surroundings at the Agricultural Hall, Islington. There is something to be said for keeping the essential layout of an exhibition like this very similar to previous shows. Those who attend regularly every year—and there are many such—can almost go blindfold to the stands in which they are particularly interested. As in previous years, the main exhibits of the "allied traders" and baking machinery were staged in the main hall. An imposing stand displaying C.W.S. products occupied a prominent part in the Gilbey Hall, where also the Millers Mutual had their cinema showing films extolling the virtues of bread, and where, too, demonstrations of cooking were given from time to time. This exhibition is almost as much a social gathering as a trade affair, and while many an order may be placed over those cups of tea or glasses of more potent beverages, one often heard the loud laughter denoting that "that was a good one." This is all to the good,

and it is well that those interested in the bakery and confectionery trades should meet at least once a year in this way and, after disposing, if possible, of their business worries and troubles indulge in a little harmless conviviality. Apart from trade and social aspects, there is, too, the very important feature of competitions. We have heard people question the value of these, but one thing is certain, the entries are always a source of great attraction and the show cases are generally surrounded by a large and interested crowd.

Value of Competitions

We rather take the view that these competitions are of great value to the trade. They act as a tonic and help to keep the industry healthy. There can be nothing more stimulating to a baker or confectioner than to see an exhibit which he knows is better than he could produce himself at the time. New ideas are produced and fresh inspiration is created for further progress. By a careful study of the various competitive classes one sees the best results that our most skilled craftsmen have been able to produce. We noticed many young men and women—some destined to be prize-winners in the future, but all intending to be our future bakers and confectioners—busy with notebook and pencil jotting down notes and ideas, about schemes of decoration on cakes, artistic display of finished goods and other points likely to be of service to them later. This year the task of the judges must have been difficult, for we could not see a tremendous difference between the prize loaves and the "also rans," but the trade has every confidence in the impartiality of the judges and their awards are accepted without question. We do not profess to be experts in the judging of bread and decorative classes—all we can say is that our impressions of the exhibition were that the high standards of past years had been fully maintained and that it will have a stimulating influence on the trade during the next twelve months.

Conference of Metrology

It has become generally accepted that state control of weights and measures is essential in all civilised communities. It is part and parcel of good government and essential to the principles of fair and honest trading. No matter what particular units of weights and measures may be used in different nations the fundamental principle is the same. It is to secure uniformity in the denominations of weights and measures used, and in the physical representation of those denominations each nation seeks to eliminate fraud and to ensure the use of correct weighing and measuring appliances. Everyone agrees with these principles and welcomes any effort to bring about greater uniformity. Similarly most people believe in a free interchange of opinion on general principles although individual details may differ. It was considered by some that an international interchange of opinion might be of value in the problems of weights and measures and with this in view the first International Conference on Legal Metrology was held in Paris in July. It was concerned with metrology controlled by law rather than weighing and measuring for scientific purposes. Obviously this is a very difficult matter, because of the different units of weights and measures employed in various countries. If all countries would accept the decimal system and buy and sell in terms of litres and metres such a conference might bring about most valuable results. As it is its usefulness is restricted to very general discussions which may or may not lead to improvements in our own system. At any rate it is an experiment worth trying again.

The Vinegar Case

In our May issue this year we referred to the prosecution at Bow Street against a trader who sold 100 per cent. artificial vinegar as "table vinegar". After a lot of wordy warfare between the array of scientific experts called for both sides the magistrate considered the matter for a further month and then fined the defendant. The issue went into the Court of Appeal and straightway the same arguments were trotted forth. In reply to the Chairman's query the solicitor for the appellant stated that the point to be decided was whether there was any significance in the term "table vinegar". He contended that this term had been applied to a substance for many years and was a correct and proper description. The respondents to the appeal (the Westminster City Council) maintained that for a substance to be designated "vinegar" at all it should be brewed.

There is no doubt of the fact that for many years the trade has recognised the term "wood vinegar" and this would be condemned by most analysts if sold just as vinegar. It is a curious fact that, while several well known public analysts went into the box and indicated that if they went into a shop and asked for vinegar they would expect malt vinegar, others admitted that if they went into a shop and merely asked for "vinegar" they would expect to get synthetic vinegar. If it is im-

possible to obtain unanimity of opinion among the public analysts who are responsible for the interpretation of the various Food and Drug Acts, it is scarcely reasonable to expect small manufacturers and shopkeepers to know where they stand. Obviously the whole matter needs clarifying.

The Decision

While it is unsatisfactory to have such a matter decided by one judicial finding, and while clearly laid down specifications as to what may or may not be sold as vinegar would be much better, it so happens that this case will form a precedent and will serve as a guide in any future case. As there has been no appeal, and the time for appeal has expired, this judgment must stand as there is no chance of reversing it. The Appeal Committee would not agree that the words "table vinegar" have become a term of art and are, by a custom of the trade, in this case used to denote synthetic vinegar. The committee regarded the fact that the majority of manufacturers used such words as "wood" or "non-brewed" signified that the term "table vinegar" is not sufficient to describe it as a synthetic product and on these grounds assumed that the purchaser would expect the "table vinegar" to be a brewed product and was, therefore, not supplied with a substance of the nature, quality or substance demanded. The appeal was, therefore, dismissed. The matter is still unsatisfactory. Apparently "wood vinegar" or "non-brewed vinegar" are regarded as correct designations for synthetic vinegar. One would have thought it better for vinegar to be defined as a brewed product dependent on fermentation and the term used only for such a product. Any addition to the term would then be regarded as indicative of adulteration or preparation by non-fermentation methods. As it stands, however, anyone manufacturing an article the description of which is to bear the word vinegar, either as part or whole of the title, will be well advised to make sure that it is malt vinegar prepared by fermentation.

Hams, Bacon and Pork

As bacon and other pig products have been very much in the limelight lately many people will be interested in the section of the Food Investigation Board's Report on this subject. One is particularly interested in the statement that the relation between the length of the pig's journey by rail from farm to factory and the weight of the carcase and quality of the bacon has been investigated and, apparently, the changes in weight during curing are not affected by the length of the journey. This is very important if it is true, because many criticisms have been levelled at the Bacon Board by pig producers about the length of journey from farm to factory. Farmers have maintained that this journey has a deleterious effect on the pigs from the point of view of bacon production. Even though the weight changes may be unaffected, it is possible that the quality of the bacon may be influenced adversely. Another interesting study is on the incidence of taint in hams. A year ago it was shown that muscular tissue from carcases of pigs that had been overheated before slaughter had an abnormally high electrical resistance. It has now been proved that hams made from these carcases show an unusually high incidence of taint. As low electrical resistance of the muscular tissue before curing is associated with a low incidence of taint it appears that measurements of the electrical resistance of the uncured material may be used to forecast the possible incidence of taint in hams.

Food Poisoning

As a race we have some quite definite standards of virtue. For instance, to say that a man is fond of dogs is to put a certain seal upon his nobility and integrity. Fondness for cats may be a little lower down the scale, but still is a definitely good attribute. Love for children comes still further down the scale, if certain deductions may be trusted.

The foregoing musings were prompted by the news that 5 tons of cat's-meat was destroyed in London recently owing to a suspicion of infection by anthrax. The promptness of action on the part of the authorities was admirable, and although we do not suggest for one moment that these precautions were taken solely on behalf of dogs and cats, incidentally the human element is safeguarded.

The picture afforded by the report on the epidemic of paratyphoid B. fever in Liverpool and district (*B.M.J.*, August 21) is suggestive in this connection. Briefly there were 11 deaths among the 123 cases of food poisoning, a fatality rate as high as 9 per cent. With considerable scientific caution it is stated that "the circumstances of the rise and decline of the epidemic were not incompatible with the belief that it was due to the infection of loaves of bread handled by a carrier of bact. paratyphosum B., who was discovered in a bakery from which was derived the bread consumed by 62 per cent. of the patients."

Another useful bit of information was that "the survival of bact. paratyphosum B. on bread crusts was established." So that if a loaf of bread is infected by the hands of a carrier the micro-organisms will duly arrive, alive and ready for their work, at their various destinations—the consumers.

An extraordinarily suggestive item appears in the report. "There were 118 cases infected prior to January 8, and only 14 between that date and February 9, when the carrier was admitted to hospital. This downward trend of the cases after January 8 may be accounted for partly by *the increased precautions which were taken by the bakery staff in washing their hands after visiting the lavatory. It was on January 21 that special instructions were given to the staffs of both the dairy and the bakery in regard to this matter.*" (The italics are ours.) Even if comment were needful we should be short of printable words to express an opinion on such a state of affairs. But we should like to feel that, in future, it will be ensured that people who handle our food do continue to wash their hands after leaving the lavatory, and that these reports are not buried in the archives and the matter forgotten until the next epidemic comes.

The infection of food which is eaten in the raw state is an ever-present menace and is independent of weather conditions. Perhaps the slaughter of a mere eleven people leaves us comparatively cold—we are accustomed to the weekly figures of the slaughter on the roads.

Further Cases

More recently two other food poisoning cases have been reported. In both cases corned beef has been brought into question. In the King's Cross and Finsbury districts there were about 50 people affected and three died. In this case the salmonella group was definitely involved and was traced to bacon. Corned beef was exonerated and the infection was found to have been carried by the knife which was used in cutting the bacon.

The Blandford cases were more unsatisfactory. No poisonous metals, no alkaloids, and no pathogenic organisms were discovered either in the organs of the people who succumbed or in the materials examined. Recourse was therefore had to the theoretical presence of toxins. Without excluding the possibility of this, we consider it highly improbable. Corned beef is prepared in large batches and every batch would produce several hundreds of 6-lb. tins. Conditions would ensure that the whole batch would be affected prior to sterilisation. Hence, if the corned beef had been the culprit in the Blandford cases it is probable that the poisoning would have been more general.

Although the percentage of people affected by food poisoning is small, there is still a need for more supervision.

We repeat what we have constantly urged—that food that is normally eaten in the raw state should be wrapped.

Cost of Living

A good many surprising facts and theories emerged out of the discussion on food costs in the House of Commons recently. The actual fact of increased costs was brought home to the Members by the report of the Select Committee which has been examining the affairs of the Kitchen Committee of the House. The report stated that if the present increase of the price of commodities was maintained, the price of meals to Members would have to be raised very considerably. The rise is not partial nor temporary nor seasonal. It is general and progressive. That it is a vital matter may be realised by the dreadful facts that some 4,500,000 people in this country spend on the average only 4s. a week on food, another 5,000,000 only 6s., and another 9,000,000 spend 8s. The significance of this emerges when it is realised that, according to the Nutrition Committee of the British Medical Association, the minimum sum required to buy sufficient food to keep body and soul together is 7s.

That the burden of increased prices bears more heavily upon the poorer classes was illustrated by the example of tea. It was pointed out that the policy of the extra duty had miscarried. More than 50 per cent. of the consumers of tea paid nothing more, because the habit of this country is to buy tea by price. People who have been accustomed to pay 2s. or 2s. 6d. per lb. for tea go on buying it at that price, but the quality has been altered. Hence the people who had been buying tea at that price did not contribute the extra duty. The whole of the burden was placed upon the poorest people who can only afford to buy the cheapest brands of tea in which there is no margin for the retailer to do anything to lower its quality.

The relation between mortality rates and cost of living was touched upon, and the point made that at the present moment the expectation of life at any given age above five in Germany, which unquestionably has no surplus of food, is four years in excess of the corresponding expectation in this country. We should like to hear more about this.

MEAT CANNING

in the IRISH FREE STATE

The factory of Clover Meats, Ltd., Christendom, Waterford, I.F.S., described by T. Crosbie-Walsh, F.I.C.

SIX THOUSAND farmers of the Midlands and South of Ireland got together and formed a Company which was intended to handle their livestock. A factory was erected in Waterford on the banks of the River Suir, and operations commenced in 1927. The Company's first activities were in the direction of bacon production, and dressed lambs and porkers were shipped to the London market.

Almost from the very inception of the enterprise its average yearly output has been 55,000 bacon pigs, 15,000 porkers and 10,000 lambs, representing a turnover of over £300,000.

The dressed beef business was begun in 1932, and at the time of the prohibition of the importation of this commodity by the British Government an average of 100 head of cattle per week was being shipped.

Up to 1930 the staff was almost exclusively English and Danish. In that year Mr. J. C. Landy, experienced in packing-house work in the United States, Argentine, China and Russia, was appointed General Manager.

During the past seven years the affairs of the Company have prospered and its activities have broadened considerably. In 1935 an agreement was arrived at between the Company and the Irish Free State Department of Agriculture, under which an up-to-date abattoir and canning plant was to be erected. The cannery was to be supplied, under the agreement, with 10,000 young Kerry bullocks yearly for conversion into corned beef.

New Cannery Started

Operations began in the new plant in October, 1935, four months after the foundations had been laid—a worthy example of hustle. Even so the season was too far advanced to enable the full number of cattle to be killed, and during the ten weeks remaining for active work some 3,000 head were slaughtered.

A setback occurred during the next season in the form of a labour strike lasting from September till Christmas, and again only about 3,000 head were killed.

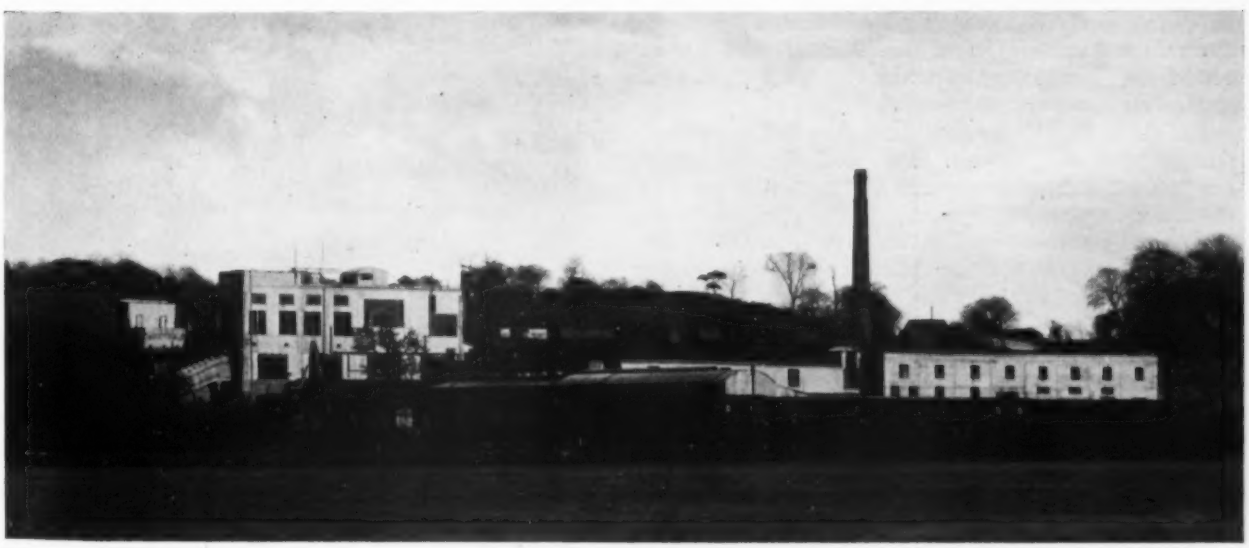
The higher prices prevailing for cattle during 1937 reduced the number of surplus cattle in Kerry, and as a consequence the Department of Agriculture terminated its agreement with the Company in July of the present year.

However, other sources of raw material are being exploited, and the cannery is actively manufacturing corned beef and has added many other tinned foods to its list of products.

The Company's Sausage Department produces 5 tons per week, and the boiled ham trade has progressed to such an extent that, during the past summer, special new equipment had to be urgently installed.

Beef Cubes

Recently a new product, in the form of " Erinox " beef cubes, has been manufactured. A very favourable verdict



". . . A factory was erected in Waterford."

Mr. J. C. Landy, Managing Director of Clover Meats, Ltd.

from the general public on the excellence of these cubes was received at the recent Dublin Horse Show, where a free cup of "Erinox" was supplied to all visitors to the Company's stand. The very latest cubing and wrapping plant has been acquired.

The manufacture of corned beef was not a new thing for the Irish Free State. As far back as the time of the Boer War it was being made. But nothing on the scale contemplated by Clover Meats had been known. Not only is corned beef manufactured, but also by-product extract of beef, and, so far as the author has been able to ascertain, the nearest places where this dual manufacture was previously being carried out were the United States and the South American Republics.

The new cannery is a steel-concrete building embodying the latest ideas in modern packing houses, from the slaughterhouse end onwards. The cattle are driven up a "ramp" to the killing pen on the first storey, and the operations subsequent to slaughtering are carried out by the overhead system. The blood and offal fall by gravity to the ground floor, where they are handled by the dry rendering method.

The bones and offal also are treated by the dry rendering process, which has superseded the old digester methods in practically every packing house in the world, and produces high quality meat and bone meals and refined edible fats. Modern dryers produce a high quality blood meal.

The elaboration of by-products constitutes a very important part of packing-house work. The difference between the costs of production and the selling price of the various commodities goes towards the reduction of the cost of the prime material, which is the meat ready for use for the canned article.

Meat Production

Two methods of obtaining the raw meat are employed: (1) The animals are left to cool, split in two parts, on the hooks. Hanging takes place until the following day, when the bones are stripped of meat. (2) The meat is stripped off the bones immediately after killing. Much hanging space is economised by this method, and the work is quicker, as the meat is more readily removed from the bones when in the recently killed state.

After the meat has been stripped there remains a proportion attached to the spinal columns and other bones. This is meat of excellent quality, but due study must be paid to the cost of trimming. In cases where the bones are subsequently treated for soup stock, the meat adhering to the bones has a definite value, depending upon the amount of valuable extracts to be taken from it; hence the problem merely lies in the cost of trimming. Broadly considered, it is questionable whether complete trimming of the bones is justifiable, unless labour is very cheap and efficient.

The meat is carefully trimmed as free as possible from all sinews and excess fat. The latter is subsequently worked up into dripping.

The period of hanging of the meat is an important one, and conditions of temperature govern this. The changes which take place during hanging have a profound effect on subsequent operations and the quality of the two main products.

The trimmed meat is cut up into large pieces, which are fed on to a rotary cutter consisting of a number of circular knives. A first set cuts the meat into steaks, which fall on to another set of cutters, from which the meat emerges the correct size for the next operation.

In meat canneries, prior to 1914, this next operation consisted of pickling, which in some cases occupied as long as three weeks or even more. The meat was placed in wooden barrels in a cool cellar and covered with a strong salt solution containing a proportion of saltpetre. The pickle was used over and over again, being reinforced with salt after each lot of meat had been removed. After some months this pickle was a wonderful mixture of organic compounds and micro-organisms of many species, but the meat product was an excellent one—attractive in flavour and extremely tender.

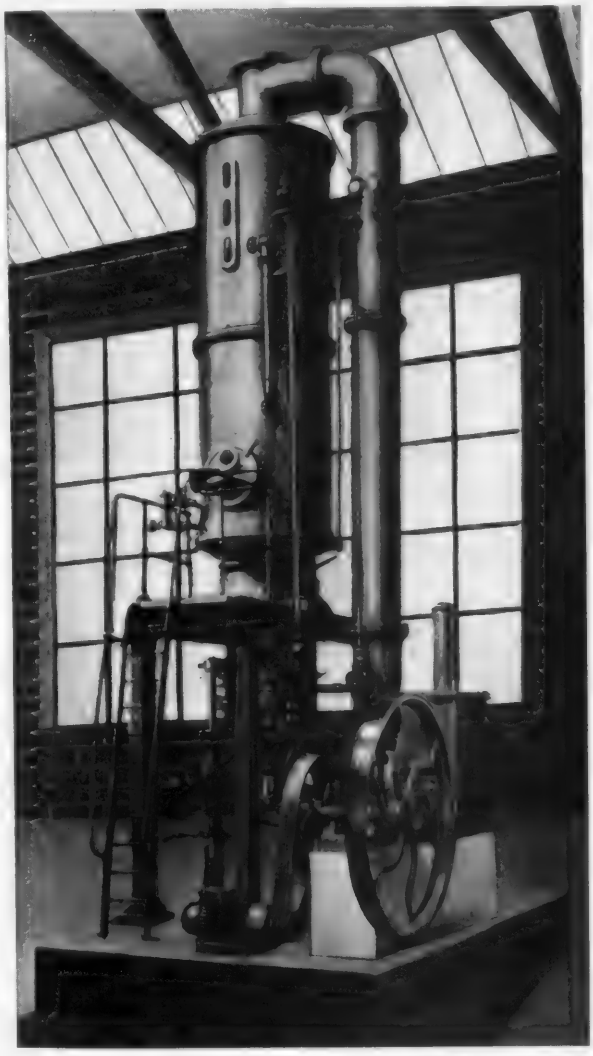
Cooking and Pickling

The pickled meat was cooked in boiling water to expel the natural moisture. The moisture content of beef depends upon its fatness, but it may be taken as being about 75 per cent. in the material prepared for corned

The cooking operation.

beef. It is necessary to reduce this to about 56 per cent. in order to obtain a firm pack.

The pickling of the meat before boiling produced a soup with a high salt content, so high that it was impossible to make extract of meat from it. Much investigation was carried out, with the object of evolving a process for doing this, and at one time the evaporation



Vacuum evaporator for beef extract.

of the salty soup was carried out on a commercial scale, de-salting plant being used. But the extract obtained was inferior in quality, and the interaction between the nitrites and organic constituents developed undesirable flavours.

The very high cost of beef during the war period rendered uneconomical its employment for extract manufacture, and although what has been termed the "hot process" for corned beef had been tried (notably in Australia) it did not come into general use until this time, and even then the more conservative of packers were unwilling to sacrifice certain qualities pertaining to cold process corned beef. Eventually, however, the hot

Picking and stuffing meat.

process entirely superseded the cold process, and continued improvements in the former have brought the quality of the pack to the level of the original one.

The Hot Process

The hot process consists of cooking the meat prior to pickling. The meat is delivered direct from the cutters into "skips," which are conducted by an overhead runway to the cooking tanks. After cooking comes the pickling process, which is conducted in large wooden vats.

The pickling operation being completed, the meat is drained and conducted to large tables, where it is very carefully inspected and any sinews which may have been left during the preliminary trimming are removed.

The meat, after inspection, is conducted to the weighing tables, from whence it is fed into the can-stuffing machine, which has a capacity of fifteen 6-lb. cans of meat per minute.

Two sizes of cans are packed—6 lb. and 12 oz.

The conventional shape of corned beef cans since the inception of the industry has been what is described as "taper", the top of the can being larger than the bottom. This involves the production of an irregularly shaped block of meat which, when sliced, gives similarly irregular slices, whether the slices are cut longwise or crosswise. But there seemed to be nothing against the use of a straight-sided rectangular can, and, after due investigation, Clover Meats, Ltd., adopted this. The block of meat emerges from the can quite as easily as

Soldering and inspecting cans.

The taper can and the rectangular can.

Can stuffer.

from the taper variety, and plenty of "collapse" (concavity of sides) is produced during vacuuming.

Closing the Cans

The 6-lb. cans, after coming from the stuffer, are adjusted as to weight, after which the caps are soldered on. The small perforation in the centre of the caps is left open. Next comes the vacuuming operation, which takes place in a circular machine in which a 24-in. vacuum is produced. The air and other gases in the cans are drawn out through the perforation in the cap; this perforation is then closed with a spot of solder by means of an electrical soldering iron.

The usual container for the 12-oz. pack of corned beef is the taper can. Here again custom was departed from. Open-top round cans were adopted, as these can be closed by a high-speed automatic vacuum double seamer.

A battery of retorts.

Despite the fact that the round can does not allow of such diminution of volume after vacuuming as does the taper or square-sided can, the pack obtained is quite compact and sliceable.

The filling of the open-top cans presented a minor problem, but this was speedily overcome by a device, designed in the factory, in the form of an attachment to the standard stuffing machine.

The sealed cans are conveyed by gravity to the ground floor, where they are sterilised in the retorts. These are of the pressure cooling type and are fitted with semi-automatic control and registering instruments.

The sterilised cans are washed by machine and conveyed to the labelling room. A proportion of the pack is maintained at incubation temperature for ten days, a coding system being used to identify each day's production.

A system for handling the pickle is efficient and well planned. The used pickle falls by gravity to the floor below, where it is analysed. Complete sterilisation is next carried out, after which it is brought to original strength by means of sterilised saturated salt solution. The pickle, ready for use, is then pumped to the top floor, from which it falls by gravity into the pickling tanks once more.

The greatest attention to the maintenance of sterile conditions is observed. The pickling tanks, after each operation, are filled with water, which is boiled. The stuffing machine is kept sweet and clean by means of the steam hose.

By-Product Extract

The other main operation is by-product extract manufacture. The soups resulting from the meat-boiling operation are drawn from the boiling tanks into large settling

An impression of the soup tanks.

Finishing pans for extract of beef.

tanks capable of holding an entire day's production. The soups are maintained at nearly boiling point, and during this settling period certain changes of composition of the solids in solution take place. After the required period the soups are filtered and are received into another set of tanks. From thence they enter the vacuum evaporator, which has an evaporative capacity of 400 gal. per hour. Arrived at a certain strength, the evaporated soup is discharged into another tank and undergoes a specified time of "resting". The strong soup at this stage has undergone considerable modification in composition and is approaching the final state. It is conducted, after filtration, into finishing pans, which are circular steam-jacketed vessels, tin-lined and provided with mechanical stirrers. The greatest care is taken during this final evaporation to avoid overheating.

The pasty extract emerges from the finishing pans with the required moisture content. This is checked on each batch by analysis, but the operative in charge of this section is able to make a very close estimate of the moisture content by the appearance of the mass as it is stirred up by the agitators. Several batches are bulked together in a mixer, which is fitted with an agitator. In this way any slight deviations from the set standard analysis may be corrected by adjusting the contents of the last batch to be added.

Soup stocks are made by treating the bones in retorts at varying pressures, according to the class of stock required. The treatment of the soups is similar to that described above.

Certain of the bones, such as the feet, are utilised for the manufacture of gelatine, of which a small proportion is used for the corned beef.

The tongues are preserved in both tins and glass, and, apart from the beef products, a large range of preserved goods are manufactured. Chicken and ham roll, ham and tongue roll, meat and chicken pastes; brawn and tinned chickens are among some of the most important.

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"GLASS" CRYSTALS in CANNED MARINE PRODUCTS

By William Clayton, D.Sc., F.I.C.

FROM TIME to time there has been reported the presence in canned fish products of small glass-like, hard crystals, which readily deceive the layman, who concludes that glass has accidentally gained admission to the pack. Manley[1] and James[2] have briefly mentioned the occurrence of "glass" in canned salmon, and Bailey[3] and Palache[4] in canned shrimps. The contents of the cans were sound in all other respects.

Palache found the "glass" crystals to be hydrated ammonium magnesium phosphate, $NH_4MgPO_4,6H_2O$, known as Struvite. He gave crystallographic measurements; the crystal measured was elongated along *a*, twinned on the basal pinacoid.

Occurrence of Struvite

Similar crystals have been reported in ambergris[5], crude liquorice extract[6], urine[7], cat's urine in feeding tests with methanol[8], bacterial growths in media containing meat infusion, peptone and inorganic phosphate[9] and in the lungs of a cadaver. Miss Porter[10] investigated the last mentioned and found crystals 1 × 3 mm. They were of two habits, with the forms *b* (010), *a* (100), *m* (110), *n* (120), *s* (011) and *p* (101).

The classical instance of struvite crystals in biological material was the famous Hamburg fire of 1842, when large crystals were observed in peaty earth mixed with cattle dung. The peculiar coffin-shaped crystals were found under the foundations of St. Nicholas Church, a coincidence attracting special attention.

A detailed description of struvite crystals found in canned shrimps was published in 1922 by Purcell and Hickey[11]. The crystal form was orthorhombic and sphenoidal, twinning in some cases. Professor Palache examined one of the twin crystals (see illustration, reproduced by courtesy of the Editor of the *Analyst*). The forms were: *c* (001), *h* (021), s_1 (101), *b* (010), h_1 (021), *t* (121), *p* (120), *s* (101). The crystal is a twin on the basal plane and shows the usual hemimorphism with respect to the vertical axis.

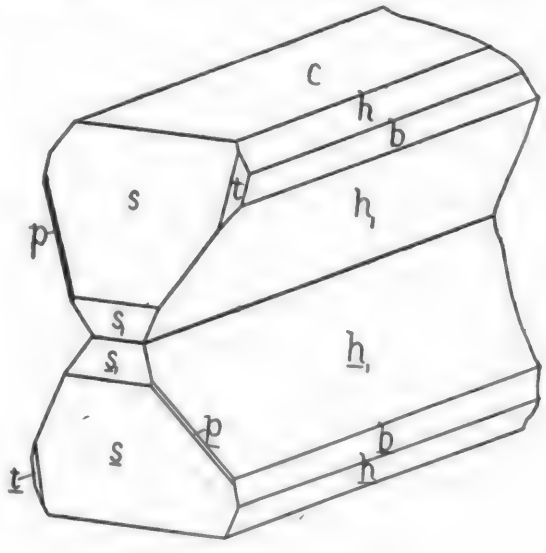
These authors mention that Wherry's test is simple and rapid for the determination of the presence of struvite in canned fish. The refractive indices of struvite and xylene are essentially the same, $n = 1{\cdot}495$. (For details of the test consult the original paper by Purcell and Hickey.)

Presence in Canned Fish

Since the occurrence of "glass" crystals in canned fish, especially salmon, is now commonly reported by analysts, it is surprising that no investigation seems to have been conducted into the problem. Research is urgently required to elucidate the conditions under which struvite crystallisation sets in.

Interesting in this respect is the influence of colloidal biological material always present. The quantitative experimental data fundamental to the purely inorganic aspect of the maximum precipitation of struvite have been furnished by Hoffman and Lundell[12], Balareff[13] and Travers and Perron[14]. The influence of soluble salts, including NaCl, NH_4Cl and Na_2SO_4, would be important in the general investigation, and here the data by Malyarov and Matskievich[15] would be of value. The possible inclusion in the crystals of foreign salts must not be overlooked, and Balareff[16], in his treatment of this special problem as a capillary chemical adsorption, includes the system $NH_4MgPO_4 - H_2O$.

Whilst the above is primarily the concern of the physical chemist, the food chemist will want to know how the ammonium ion is furnished by the fish. Dr. R. H. Bedford, bacteriologist at the Pacific Fisheries Experimental Station, Prince Rupert, B.C., in a report to the fishing industry, believes that ammonia production is a function of bacterial development. Accordingly, he advocates disinfection of the ship's hold, handling of the salmon to avoid abdominal puncturing, and avoidance of piling of the fish, which squeezes out slime, food and bacteria and causes heating of the mass. He advocates icing all fish which cannot be processed in the can within about six hours.



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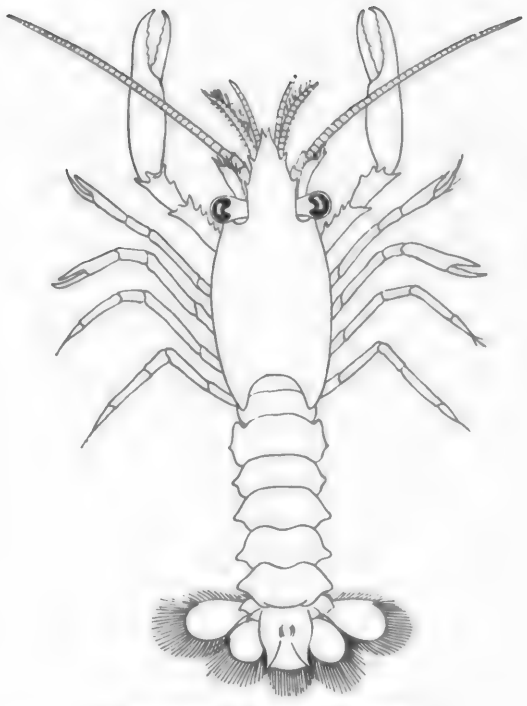


Fourth-stage lobster (magnified).
(*With acknowledgements to the Editor*, "The NATURALIST".)

The
LOBSTER

Its Food Value, Life History, and Modern Methods of Preservation and Canning

By Elliot B. Dewberry, M.R.I.P.H., M.R.San.I.

THE LOBSTER, sometimes described as the locust of the sea, is regarded as the king of crustaceans because of its size, strength, abundance and economic value. It is referred to in the ancient writings of Aristotle and Pliny and by Roman historians in their descriptions of epicurean feasts. The supplies from the Atlantic Ocean, between Morocco and Scandinavia, furnished large quantities for the people of western Europe, who considered the lobster a luxury. So much sought after were they that by the seventeenth century the supply diminished through overfishing.

Different Species

There are several species of the lobster, but the European and American are the most valuable of all the edible varieties. The American lobster (*Homarus americanus*) is found on the Atlantic coast from the Straits of Belle Isle (Labrador) to Cape Hatteras: the most important fisheries are, however, to be found off the shores of Canada's provinces, *i.e.*, Nova Scotia, New Brunswick, Prince Edward Island and Quebec, where hundreds of men are employed in the industry during the season. A large part of the catch is marketed in canned form, although of late years there has been increasing growth in the live lobster trade with the United States of America.

The European lobster (*Homarus vulgarus*) lives off the coasts of the British Isles and the western coast of Europe from Norway to the Mediterranean. The south-western coast of Norway appears to be the central point of its distribution, and still supports the largest of the European fisheries.

Among the European varieties is the small Norway lobster (or Dublin prawn, as it is sometimes called) which inhabits the muddy bottom of the deep waters of the Irish Sea. It is small, but very beautifully marked with red and white; it is of little commercial value, however. Another species, the spiny or rock lobster, or sea crawfish, is found on the south and south-west coasts of the British Isles and is much esteemed as a food in France.

Food Value

The esteem in which the lobster is universally held as a delicate food is indicated by the numbers brought to market. The total quantity and value of lobsters of British taking landed in England and Wales during the last three years were as follows:

Year.	*Number* (100s).	*Value* (£).
1934	8,027	49,841
1935	7,251	46,094
1936	7,603	49,726

The total quantity and value of canned lobsters imported into the United Kingdom from Canada during the same years were as follows:

Year.	*Quantity* (*Cwts.*).	*Value* (£).
1934	20,306	266,167
1935	21,614	284,226
1936	15,100	214,517

The following tables give the chemical composition and nutritive value of the fresh and canned lobster:

Fresh Lobster

	Protein. (*Gm. Per Cent.*)	*Fat.* (*Gm. Per Cent.*)	*Carbo-hydrate.* (*Gm. Per Cent.*)	*Energy Value Per Kilo.* (*Calories.*)	*Protein.* (*Gm. Per Lb.*)	*Fat.* (*Gm. Per Lb.*)	*Carbo-hydrate.* (*Gm. Per Lb.*)	*Energy Value Per Lb.* (*Calories.*)
Flesh only	19·7	0·3	1·9	914	89·4	1·4	8·6	415
Edible matter only ...	19·2	1·5	2·0	1,009	87·1	6·8	9·1	458
Edible matter less waste ...	11·3	0·9	1·5	609	51·3	4·1	6·8	276

(After Plimmer.)

In comparison with the above, the energy value per pound of beef (forequarter) has been estimated at 1,126 calories and the hindquarter at 1,570 calories.

Canned Lobster

	Water. (*Per Cent.*)	*Protein.* (*Per Cent.*)	*Fat.* (*Per Cent.*)	*Carbo-hydrate.* (*Per Cent.*)	*Ash.* (*Per Cent.*)	*Fuel Value Per Lb.* (*Calories.*)
Min.	76·2	16·7	0·5	0·5	2·1	345
Max.	79·4	19·5	1·7	0·6	2·8	445
Av.	77·8	18·1	1·1	0·5	2·5	390

(After Tressler.)

The flesh of the cock lobster is considered more delicate for eating than that of the hen. The indication of good and fresh condition is a clear hard shell with the flesh plump and firm. After cooking, the tail, on being pulled out, will spring back smartly, but if the lobster is stale springiness is absent.

The noise resembling groans and cries emitted when a lobster is plunged into boiling water frequently affords a basis for discussion, often contentious. As a matter of fact, the lobster possesses no vocal organs, and the noise is caused by the forcible ejection of air bubbles from crevices in the shell, due to expansion by heat. The most humane way of killing a lobster is to place it in cold water and gradually raise the temperature. Loss of consciousness quickly ensues, resulting in a painless death.

Life History

The common lobster lives in comparatively shallow water where the sea bottom is rocky and the nooks and crannies afford suitable hiding places. It is an agile, cunning and pugnacious animal with sedentary habits and a keen sense of smell and touch, any movements being governed by abundance of food and the temperature of the water. The crustacean, however, undertakes seasonal migrations, coming inshore during spring and retreating to the deeper offshore waters in autumn. It is most active at night, exploring and digging up the sea bed in search of food, which chiefly consists of fish, molluscs such as clams or mussels, shrimps, starfish, eelgrass and seaweed. Although often called the "scavenger of the sea" it probably prefers fresh to stale food and, like the owl, rejects the bones and other indigestible portions of food eaten. Lobsters appear to have long intervals between meals, and eat ravenously when any food is found; they will sometimes tear off and devour the eggs carried by the females. These voracious habits in all probability account for their being so easily caught in baited traps.

When travelling over the sea bottom the lobster walks on the tips of its slender legs, holding the nipping claws raised in front, at the same time waving its antennæ or feelers aloft and turning its protruding eyes in every direction. When seeking a suitable burrow in which to hide, the preliminary examination of any likely crevice is made with the long feelers, the great claws being afterwards inserted. If no enemy is found lurking therein the lobster takes possession by turning round and backing quickly into the hole where it lies motionless with its large claws close together near the entrance and its feelers waving slowly to and fro. When alarmed it opens and shuts its claws and suddenly shoots backward into its burrow, a surprising distance, by flexing its powerful tail.

The lobster captures its prey by stealth; hidden beneath a bunch of seaweed, or tucked away in a crevice among the rocks, it waits until its victim is within striking distance. The victim is then seized between the thumb-and-finger-like grasp of the large claw and held securely by the small one, while the lobster sucks away at its leisure. The fighting habits of lobsters do not extend solely to their protection from their enemies, but they also fight between themselves, often losing legs and claws in the fray.

The colour of the lobster varies according to the situation from which it has been taken, but is usually a beautifully cloudy mottled dark blue to bluish-black, shaded off to orange-yellow on the underside. The colour is produced by the pigment "Zoonerythrin" which changes to a nearly uniform bright red when the lobster is boiled, the heat causing a chemical action to take place. Occa-

sionally lobsters are trapped which are bright red in colour.

The lobster's body and limbs are encased in a strong shell-like armour, termed "chitin", which is thin and soft at the joints allowing free movements of the parts. It not only protects and gives support to the internal organs, but also affords points of attachment for the muscles by which the animal moves. Although the animal is enclosed in this shell it is sensitive to changes of temperature and its sense of touch is not impaired, as the minute hairs of various sizes all over the body and limbs detect slight movements and vibrations in the surrounding water. The fore part of the shell is in one piece, but the hinder portion has jointed segments, each having beneath it a pair of fin-like limbs called "swimmerets", the last pair forming the tail fan. Attached to the fore parts of the body are the four pairs of walking legs, and in front of these are the large powerful pair of nipping claws, which are not alike in shape or size. The large claw has the fingers armed with blunt round knobs and is adapted for crushing small shellfish, whilst the small one has the inner edges of the fingers sharp and set with claw-like teeth and is used for holding or tearing the prey.

A curious feature of the lobster is that it can voluntarily cast its limbs. Should one of these become injured or seized during a fight, the lobster can, by causing a spasmodic contraction of certain leg muscles, surrender the limb. After a time a new one commences to grow and further growth takes place each time the lobster moults until finally a perfect limb is formed.

How the Lobster Moults

The shell of the lobster does not increase in size to any appreciable extent and only permits a very limited growth, so that it becomes necessary for the animal to cast its shell entirely at certain intervals. As the time of moulting approaches the lobster appears uneasy and shy, and seeks shelter. The shell also undergoes peculiar changes and loses its bright colour. The soft membrane between the shell covering the fore part of the body and that covering the tail now splits, and it is through this gaping slit that the lobster pushes itself. By vigorous tugging of the muscles the body is gradually worked loose. Should the shell be too hard or rigid for the animal to escape, death occurs. The covering formed under the shell immediately before moulting has a fresh and bright colour but the flesh is soft and flabby. After moulting the latter rapidly increases in size, owing to the absorption of water. The animal now diligently seeks foods containing the lime necessary for hardening the newly formed shell, but if this is scarce it does not hesitate to eat its cast-off covering. It is at this period that the crustacean is most liable to attack from its enemies, which include the cod, dogfish, skate, shark and ray. It usually takes six to eight weeks before the new shell is really hard. Adult male lobsters as a rule moult only once, and females twice, a year between the months of April and November. The increase in the size of the body is manifest and varies from 13 to 15 per cent. of the lobster's length.

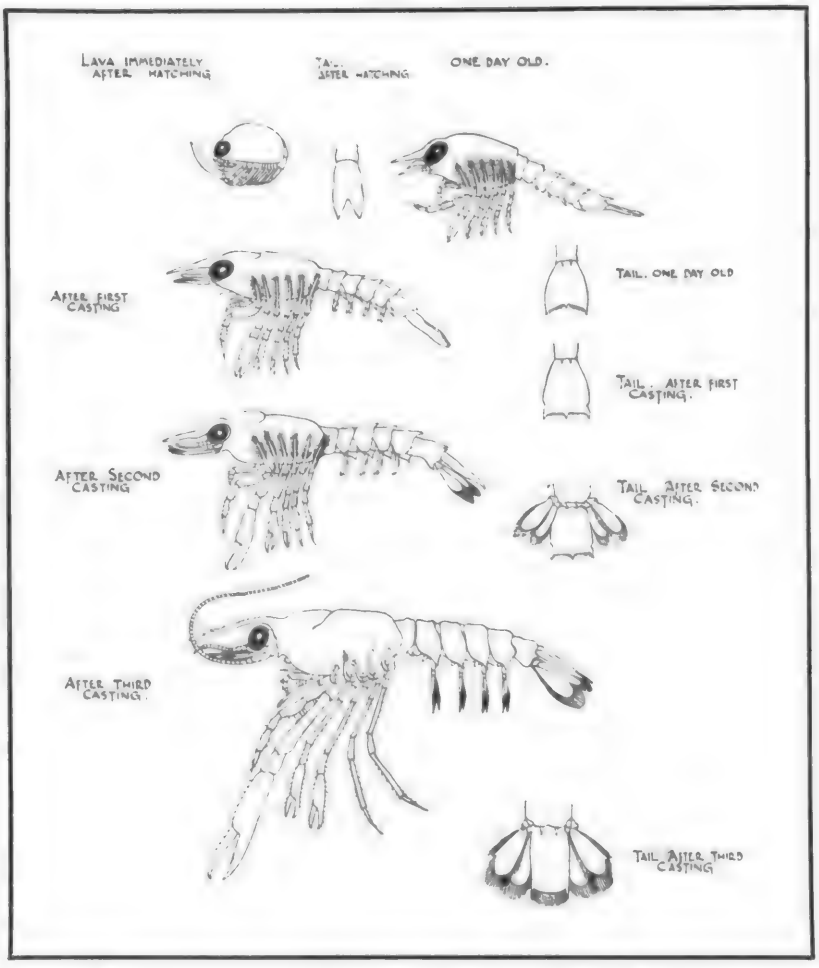
Sex

The sex of the lobster can easily be distinguished. The male or cock is more slender than the female and possesses stronger and larger claws in proportion to the body. The abdomen is five jointed and has two additional claws or "daggers" as they are sometimes called. The female or hen is smaller generally; its abdomen is broader, has deeper side plates and is seven jointed. She becomes sexually mature when 10 to 12 inches long and usually lays one batch of eggs a year. The globular eggs, each of which measures one-sixteenth of an inch in diameter, are olive-green to greenish-black in colour, have a little clear area at one end and may number from 3,000 to 100,000 according to the lobster's size. They hang in bunches from the swimmerets and are so carried until they hatch. When a hen is "in berry" she usually seeks the protection of the rocky shore. A period of from ten to eleven months elapse between the time the eggs are deposited and hatching, temperature playing an important part in the process. During incubation the swimmerets are kept constantly waving backwards and forwards, thus aerating and cleansing the eggs, and at the same time facilitating the escape of the fry as hatching takes place. The free swimming larva differs considerably in general appearance from its parents. It has a short, stout, shrimp-like body, with a row of spines on the back, a pointed snout and long feelers. The body is blue in colour, but some parts are transparent and dotted with red. The large gleaming emerald eyes contain in life a white iridescent pigment and the sight is good compared with the poor sight of the adult. The claws are at first hardly larger than the body, the nipper claws developing after the third week. The larva uses its feathery feet as paddles, enabling it to swim and live near the surface of the sea. It moults about the second day after hatching and the first three weeks of its life is termed the "Zoea" period. About this time the larva is exposed to many dangers: its helpless condition, conspicuous coloration, and fairly large size result in its extensive destruction, being an easy prey for a host of enemies. The larva feeds on minute marine animals and plants, small crustaceans, water fleas, etc. It also has cannibalistic tendencies.

There are two well-marked stages in the life history of the larva, the first being the surface swimming stage and the second where it loses these abilities and sinks to the bottom of the sea. Between these main periods there are several intermediate stages during which it moults five or six times.

When about two months old the larva is about three-quarters of an inch in length and although still able to swim, the feathery-like paddles gradually diminish in size. Later the transparent appearance disappears and the body becomes darker in colour, denoting that the young lobster is about to descend to the bottom of the sea, where in course of time it assumes the habits of the adult, seeking the protection of stones and rocks under which to shelter from the attacks of its enemies.

Lobsters are in season all the year round, but are considered to be in the best condition during the summer months, when they are most abundant. They are cap-



Stages in the development of the lobster (magnified 5 times).
(*With acknowledgements to the Editor*, "The NATURALIST.")

tured mainly in creels or pots of wicker work, hemispherical in shape, with a funnel-shaped top, on the principle of the old-fashioned rat trap; or in hoops covered with netting having funnel-shaped openings permitting entrance but preventing escape. The traps, which are baited with pieces of fish such as small herring, halibut, hake or cod-fish heads, etc., are sunk to the sea bottom by means of weights, their position being marked by floats or buoys. The lobster's curiosity is sufficient to encourage it to "walk into the trap", but the latter being baited stimulates this desire. As it has not a very high degree of intelligence, where escape from captivity is concerned, it remains in the pot.

Legislation Governing Size

Under Fisheries (Oyster, Crab and Lobster Act), 1877, it is illegal to take, have in possession, sell, expose for sale, buy for sale, any lobster which measures less than 8 inches from the tip of the beak to the end of the tail when spread as far as possible flat. In certain of the local sea fisheries districts the taking of berried lobsters is also prohibited by bye-laws. Lobsters weighing as much as 15 lb. each are sometimes caught, but the European variety rarely reaches 10 lb. in weight. Occasionally a giant lobster of 28 lb. weight, having a length of 2 feet from beak to tail, is trapped. The average weight sold in the markets is usually from 1 to 2 lb. Lobsters are sent to market alive in wooden boxes and packed in sawdust, heather or seaweed.

Early Canning Operations

It is recorded that lobster fishing first commenced off Cape Cod and among the Elizabeth Islands on the coast of Connecticut early in the last century. Kensett and Durand of New York carried out canning experiments in 1815 and 1825. Kensett applied for patents in the United States for preserving lobsters, but these were not granted as the authorities doubted the practicability of such a scheme. In 1819 William Underwood arrived at Boston from London, where he eventually settled, and set up a canning industry, and in 1835 commenced packing lobsters in glass jars. Kensett and Underwood were

doubtless the pioneers of the canning industry in America.

The lobster was always one of the most difficult animals to preserve satisfactorily, either when considered from a chemical standpoint or otherwise; nevertheless it formed the material for the first canning industry of any magnitude in the Dominion of Canada. In 1840 Charles Mitchell, a Scot, arrived in Halifax, Nova Scotia, from Aberdeen; he had been making tin cans for packers and was well acquainted with the industry. He erected the first factory for canning lobsters at Liverpool, Nova Scotia, in 1841, and so the great Empire lobster industry commenced.

In 1872 there were about 44 lobster canneries in Canada. In 1880 the number had increased to 200 and in 1895 to nearly 650, reaching its zenith in 1900 with 900 plants. In recent years, however, the number has been reduced and the industry to-day has been stabilised at between 330 to 360 canneries. With the exception of a small Newfoundland pack the Canadian maritime provinces have a world monopoly on the production of canned lobster.

These records show that much of the lobster business can be traced to the influence of William Underwood's ventures in preserving this food product. It is equally interesting to notice how much of the early success obtained appears to have rested upon the methods introduced by Charles Mitchell. To-day great improvements have been made in the lobster canning process, partly due to the educational efforts by the Biological Board of Canada and partly as a result of the Board's scientific investigations at the reseach stations at Halifax and St. Andrew.

Canning Regulations

All Canadian canneries are subject to periodical inspection under the fish regulations governing canned fish and shell-fish and the operations of canneries. No lobster cannery is allowed to operate except under a permit from the Department of Fisheries, which states that the sanitary and other conditions are in accordance with the requirements of the Meat and Canned Foods Act of 1907 and also the above regulations. This is determined by means of a "grading form", marks being allotted for suitability of premises, construction of equipment, operation and sanitation. A minimum of 160 marks (out of a maximum of 200) having to be obtained before the canning permit is issued.

Grading and Transportation of Lobsters to Cannery

The lobsters are graded on board the fishing vessels. Those of 9 inches in length and under are transferred to a collecting boat which takes them ashore, where they are unloaded into trucks for transportation to the canneries. Those over 9 inches in length are reserved for export to the U.S.A. During the above operations great care is taken to prevent undue exposure. The lobsters are kept moistened with sea-water, especially round the gills, as only vigorous healthy crustaceans make a first quality canned product. At the canneries they are kept alive by placing them in "slat-holding crates" immersed in cool, clean, free-circulating sea-water. No lobsters are cooked unless they can be dealt with immediately, otherwise "smut" formation (production of iron sulphide) occurs in the cans during storage.

Lobsters decompose rapidly; consequently the various processes are carried out as quickly as possible to prevent spoilage and wastage.

Cooking, Preparation and Cleaning

The crustaceans are usually cooked in briskly boiling sea-water from 12 to 15 minutes, but in the larger canneries live steam is used, about 500 lb. being dealt with at one time. The latter method is cleaner and more economical. The lobsters are afterwards sprayed with cold water and passed to the preparation and "cracking tables". Each is divided into three portions—tail, body, claws and arms—the meat being removed by hand by means of a specially made heavy knife. The meat from each portion is kept separate and after being cleaned of green gut, clotted blood, etc., is thoroughly washed in running water, but not allowed to soak. The red meat must be bright and uninjured and the white free from discoloration. Only the tail, claws and arms are canned, the residuals—the breast, thumbs and liver—being made into lobster paste. The lobsters' bodies are ground, packed in tins and sold as food for silver fox. Offal from the canneries is utilised as fertiliser on the land.

Packing the Cans

The method of packing the can, which is lacquered and has a parchment liner, is of considerable importance. The quantity of meat allowed for the different sized cans is specified in the "Meat and Canned Foods Act". It is duly weighed beforehand. Allowance has to be made for shrinkage, as 7 oz. of shelled meat only produce 6 oz. of dry meat.

The tail is coiled in the bottom of the can, the fine arm meat in the centre and the whole claws on top, darker side uppermost—in "sardine or clapboard" fashion, using right and left claws alternately. Upon the meat is poured a freshly prepared solution of sodium chloride—strength 2 to 2½ per cent.—which has been boiled for 30 minutes. The addition of this pickle brings out the lobster flavour. The quantity to be added to the various sized cans is as follows:

Size of Can.	*Quantity of Pickle.*
¼ lb.	½ oz.
½ ,,	1 ,,
1 ,,	1½ ,,

Each batch of unsealed packed cans is then placed in an exhaust box of the water bath or steam type, at 212° F. This obviates the formation of flippers or springers and reduces the strain on the seams of the cans during and after processing.

The sealing of the cans is carried out by machinery, after which they are processed in retorts at 240° F. at 10 lb. pressure for the following periods:

Size of Can.	*Minimum Time.*
¼ lb.	28 minutes
½ ,,	32 ,,
1 ,,	45 ,,

Then the cans are cooled, either by immersion in, or spraying with, cold water; cleaned, inspected for abnormalities (leaky seams, etc.) and finally labelled by hand or machinery.

Examination

The keeping quality is tested by incubating (at 100° F.) samples from each batch, and any under-sterilised cans will show spoilage in a few days.

The cans are packed in wooden cases—96 quarter-pound or half-pound cans, or 48 one-pound cans to the case—and stored at a temperature just above freezing point, until required for export.

The National Mark Fruit Products Scheme

THE National Mark Scheme for Fruit Products, which has hitherto been confined to two grades of fruit juice syrups, has now been extended to include the following additional products: fruit juices, fruit concentrates, and aerated fruit beverages. In addition, the definitions of quality for fruit juice syrups have been amended.

The revised scheme is based on the Agricultural Produce (Grading and Marking) (Fruit Products) Regulations, 1937, which have recently been made by the Minister of Agriculture and Fisheries. Copies of the Regulations (S.R. and O., 1937, No. 788) may be purchased from H.M. Stationery Office, Adastral House, Kingsway, London, W.C. 2, price 2d. each (2½d. post free).

Particulars of the Scheme are contained in Marketing Leaflet No. 53, which may be obtained free of charge from the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W. 1.

Profit from Nuisance

AN industrial engineer has achieved the superlative in converting nuisance into a profit by devising an apparatus which copes with the problem of the millions of flies which hover over the manure beds on mushroom farms. A huge suction fan draws the flies across a refrigerating coil, which chills them, and they are dropped, dormant, into large milk cans. Lids are clapped on the cans, and the flies are shipped to frog growers, who chill them again and serve them to their frogs. Some mushroom growers now realise from the sale of flies nearly as much as from the sale of mushrooms.

Tin Electrodeposition Baths

ALTHOUGH acid baths for electrodeposition of tin are attractive because of their high efficiency and the fact that they can be worked at room temperature, they suffer from the disadvantage that they are unstable solutions and the deposits tend to be patchy and in loosely adherent needles. To some extent addition agents enable these drawbacks to be overcome. Further research to improve these addition agents has been carried out on behalf of the International Tin Research and Development Council, which has just published the results in Technical Publication Series A, No. 56.

In this paper A. W. Hothersall and W. N. Bradshaw show that additions of sulphonic acids, such as those of cresol phenol or benzene, are ineffective when the acids are pure. Crude qualities, however, contain certain by-products of sulphonation which enable smooth deposits to be obtained, especially when gelatin is present, but the solutions deteriorate rapidly and have poor covering power. Hydroxy compounds of the aromatic hydrocarbons, such as β-naphthol and resorcinol, are most effective, and they can be used with gelatin or the more stable lysalbic acid which is prepared from egg albumen. A solution was found which had good covering and throwing power and was substantially unimpaired after long use.

Copies of the above publication may be obtained free of charge from the International Tin Research and Development Council, Manfield House, 378, Strand, London, W.C. 2.

Vitaminised Confectionery in Soviet Russia

THE Commissariat of the Food Industry of the U.S.S.R. has recently held an exhibition of vitaminised confections of different kinds produced by the factories under its control. The Babayev confectionery factory exhibited a nut and fruit caramel containing the anti-scurvy vitamin C, a cream toffee called "Kiddy's Karamel", and a nut caramel "Noisette", both containing vitamin A, which promotes growth and strengthens resistance to infection. Among other products of this factory are caramels containing anti-rickets vitamin D. The vitaminised sweets are attractively packed in small doses of 50 to 200 gm. The Udarnitsa factory showed various jams containing vitamin C, such as plum jam, black-currant jam mixed with nuts, also apple jellies mixed with nuts, and a paste of apple and sweetbriar rose. The Laboratory of the Institute of Research in Engineering and Technological Processes of the Bread Baking Industry showed samples of rusks, biscuits, pies, and buns containing the vitamins C, A, and D. The demand in some parts of the country for vitaminised products has been so great that the confectionery factories of the Union are putting on the market this year 30 million doses of different vitaminised confections.

UNFERMENTED FRUIT JUICES . . . . . .

SECOND INTERNATIONAL CONGRESS

THE IMPORTANCE of unfermented fruit juices was exemplified by the papers read before the Second International Congress for the Utilisation of Unfermented Fruit Juices held in Berlin from August 2 to 5.

Professor Bela Szabo of Budapest pointed out the necessity for the proper degree of ripeness of the fruit as the necessary condition for proper quality of the juice. He mentioned twelve important principles concerning the condition of the raw material.

Engineer A. K. Zweede, Wageningen (Holland), described his special experience in his country. He also stressed the necessity of employing fruit at an exact stage of ripeness.

Markus Mellin, Karlsham (Sweden), mentioned that juices made from gooseberries, bilberries, raspberries, blackberries and others are in demand in Sweden. All the berries except the strawberry are more or less rich in acid, and their juices, therefore, must receive an addition of water and sugar to make them palatable.

Herr J. Bauman describes the technical details of the pasteurisation process explaining the methods used at the present time in the German factories. According to him, the warm and cold processes were equally used. He also stressed the fact that the quality of unfermented fruit juices was less dependent on methods of sterilisation than on the selection of the right kinds of fruit and its proper handling.

H. D. Gätjen read a paper on "Tank Storage of Unfermented Fruit Juices" and described the Böehi method for storing unsterile juice in saturated solutions of carbon dioxide. By this method the yeast cells and other organisms in the fruit juice are not destroyed but are rendered practically inactive. The pressure of the carbonic acid is 8 atmospheres, this pressure determining the quantity of gas dissolved.

A paper, "Recent Experience Concerning Concentrated Fruit Juice", was read by Dr. L. Engelhardt, who described the Krause-Linde process, which consists of cooling down the fruit juice to $-25°$ and centrifuging the ice crystals.

Dr. Ernst Sutter also spoke about the special production of concentrated fruit juices and described the vacuum evaporation process. He said there was hardly any loss on aroma during evaporation.

Dr. Steere of the American Embassy mentioned that the non-fermented fruit juice industry had only recently been developed in America.

Dr. Polzer summed up the work of the Congress and rejoiced in the fact that the industry had attracted a great number of collaborators, and that this great success in Germany was based on the co-operation of progressive horticulture and vine culture and the champions of national health. He mentioned the success of the industry in various countries, especially in Switzerland, where in some parts 20 to 30 litres of fruit juice were annually consumed per head of population. He suggested that the development of non-fermenting fruit would be likely to be a saviour of horticulture, and called upon the representatives of the thirty-four States for the Congress to continue their work for the welfare of the nations.

Dr. F. Schmitthenner, Bad Kreuznach (Germany), read a paper on "Cold Sterilisation of Unfermented Fruit Juice".

COLD STERILISATION OF UNFERMENTED FRUIT JUICE

By Dr. F. Schmitthenner, Bad Kreuznach (Germany)

Nature of Sterilisation

Cold sterilisation of unfermented fruit juice is based on the so-called EK filter (sterilisation filter) of the Seitz-Works, which allows complete filtering of any micro-organisms out of liquids that lend themselves to filtering. There come into question in the case of fruit juices not only the agents causing fermentation (yeasts), but also various kinds of bacteria and mould fungi naturally inherent in unfermented fruit juices.

Pre-treatment of the Unfermented Fruit Juice

Economical working with the EK filter requires proper pre-treatment of the unfermented fruit juice. Pre-filtering eliminates the substances causing turbidity, while the filtration-resisting pectine is removed either by the aid of gelatine or is separated by "Filtragol". Both methods have proved to be satisfactory in general, although certain difficulties are never quite out of the question with either. In such case a combination of both methods has often been used successfully. With the cold process it is immaterial which of these two preliminary methods is employed. The main advantage of the "Filtragol" treatment is that it will result in a diminished quantity of turbid matter.

Pre-filtration

The extremely fine pores of the EK filter (they must be smaller than the smallest micro-organisms) require a very thorough pre-clarification of the unfermented fruit juice with the aid of the aforesaid preliminary treatment, which should be carried out with the best filters. Asbestos alluviation filters have proved to be especially well suited. In some cases a centrifuge may also be successfully employed as a preliminary step with this kind of filtration.

Sterilisation and Storing

The complete elimination of all organisms is effected by means of the Seitz sterilisation filter. Direct bottling is not advisable since subsequent separation may result in detachments unfavourably affecting the clarity of the unfermented fruit juice, and it will for this reason be necessary to store the unfermented fruit juice. Passing the fruit juice from the sterilising filter to the storage containers should be done under sterile conditions and the containers should also be sterilised. All steps and measures should take place under aseptic conditions, but this requirement, as shown by practice, may easily be complied with. Of the total production of unfermented fruit juice in Germany, 50 per cent. of the apple juice is produced by the cold process or in combination with the hot process, while about 85 per cent. of the grape juice is made by the cold process.

Combined Process

There has been adopted of late to a growing extent a combination of the EK process, on the one hand, with the hot process (especially in the case of apple juice), with the Böehi process, on the other hand (with apple and grape juice). The storing is effected with one of these processes, the decanting by means of the EK filter. Both methods have proved satisfactory.

The Böehi Method—viz., the saturation of the fruit juice with 15 per cent. carbonic acid and storing in pressure tanks—has the material advantage that the operation need not be aseptic, which is important in view of the scarcity of trained help, and yet offers absolute protection against the development of organisms. Its disadvantages are the relatively high

(*Concluded on page* 357)

OTHER PEOPLE'S CANNING JOBS

1.

2.

1. Tomato Juice—U.S.A.

Filling and closing cans of tomato juice. Empty cans enter from the inclined runway at the right, are automatically filled, and pass to the closing machine at the left, where ends are double-seamed.

2. Filling Peas—France

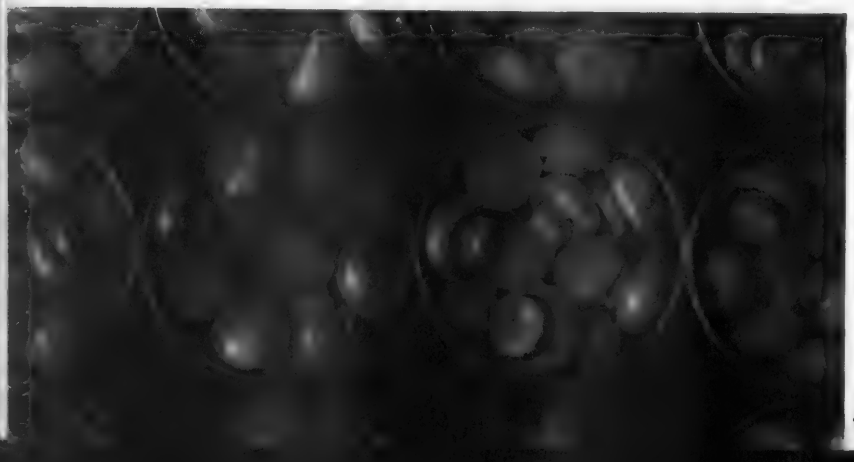
Picture by H. Lacheroy shows the can-filling room in a French cannery at the height of the pea season.

(Courtesy Office Technique pour l'Utilisation de l'Acier.)

3.

3. Canned Cranberries—U.S.A.

Cranberries are extensively dealt with on a commercial scale in U.S.A. Picture shows fruit grading in progress at the Cranberry Canners Inc.



4.

4. Mushrooms—France

The excellent grading of the mushrooms is clearly depicted in this photograph by H. Lacheroy.

(Courtesy Office Technique pour l'Utilisation de l'Acier.)

5.

6.

5. Corn Packing—U.S.A.

This picture shows cutting machines stripping the corn from the cob in a large American cannery. This commodity forms a large proportion of the annual American canning pack.

6. Vegetables—U.S.S.R.

The Mikoyan canning plant for canning vegetables, chiefly tomatoes, was recently built at Krymskaya Station (Azov—Black Sea Territory). The output in 1935, the latest year for which figures are available, was 46 million cans. Photo shows machine testing hermetic seals at the rate of 70,000 cans per six-hour shift.

7.

7. Beer—U.S.A.

Packer and sealer handling beer cans and cases at the Wehle Brewing Company, Standard Knapp Corporation.

(Courtesy C. S. Du Mont Ltd.)

8.

8. Pineapple—Pacific

General view in a Hawaiian Pineapple Factory. Rows of picking, or sorting, rolls are shown in the immediate foreground.

9. Tunny Fish—Japan

It was only in 1931 that Japan started to export canned tunny, mainly to America. The production reached 381,585 cases in 1935. The illustration shows the cans entering the retorts.

(Courtesy of Mitsui & Co. Ltd.)

9.

STORE BURN

in

FROZEN MEAT AND POULTRY

By T. Moran* and N. L. Wright†

STORE BURN is the name given to the amber-coloured shrivelled patches which are often seen on the surface of frozen meats. These patches are caused by the evaporation of ice crystals leaving behind tiny air pockets which tend to scatter the incident light and so cause the tissue to appear lighter in colour[1] (Fig. 1). When the meat is thawed these patches, although less marked, still persist, indicating that in the process of drying the muscle fibres have undergone irreversible change. Excessive drying leading to store burn can be related to a low relative humidity of the air in the cold store and/or, in the case of products such as offals (livers, kidneys, hearts, and sweetbreads), which are packed in boxes, to the absorption of water by the wood or paper lining.

With the larger units of frozen meat—*e.g.*, a carcase of lamb or a quarter of beef—drying of exposed muscle is reasonably uniform, so that the colour as a whole tends to weaken if drying is excessive; in such cases the meat is said to have lost its bloom. In the transport of frozen lambs from New Zealand the average loss in weight from the slaughter floor to retail sale in this country (covering cooling and freezing, 28 days' storage in New Zealand, ocean transport and 28 days' storage in Great Britain) is 3·95 per cent.,[2] so that some loss of bloom in the meat is inevitable. Experiment has shown that the loss in weight and loss in bloom can be reduced by "bagging" the carcases in a material which is relatively impermeable to water vapour. The problem of finding such a bag which will at the same time withstand the handling during the loading and discharge of the meat, however, has not yet been solved.

In the case of small meats, such as offals, the problem of reducing evaporation and consequent freezer burn has gone a long way towards being solved by packing the offals in boxes lined with greaseproof or parchment paper, whilst considerable quantities of lambs' livers are transported in sealed metal pails.

Protective Wrappings

Barnicoat[3] has studied the problem in the light of meat works practice. He measured the protection offered by ordinary butchers' paper, a vegetable parchment, and a transparent cellulose paper; he also studied the effect of glazing frozen offals with blood serum before they are packed. He found that this glaze definitely delayed the onset of store burn, whilst of the papers examined only the transparent cellulose prevented store burn over a period of three months at 14° F. Barnicoat also demonstrated, as would be expected theoretically, that the more constant the temperature the less the extent of store burn.

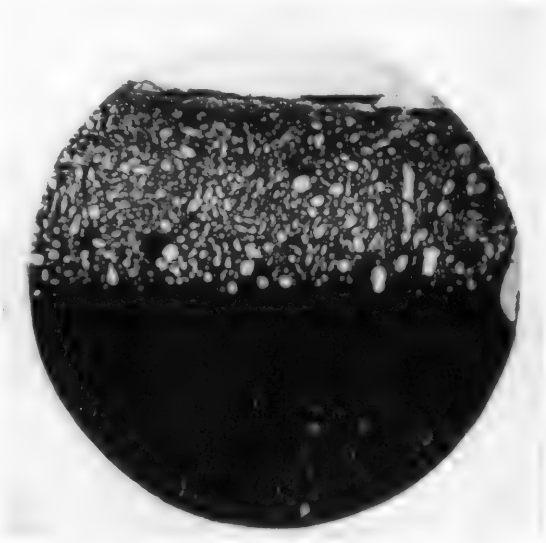


FIG. 1.—Frozen lamb's kidney (mag. 33) showing air pockets which are responsible for store burn.

It is clear that store burn in frozen offals can be reduced or eliminated either by wrapping the individual organs in a paper or other material which is impermeable to water vapour or by simply lining the box with such a material. Waxed, oiled and parchment papers vary in their permeability as was shown experimentally by Vickery,[2] who used dishes made of aluminium with the contiguous faces of the dish-flange and the loose flange machined flat so that they can be pulled together by eight bolts. The faces of the flanges are covered with a suitable grease to make them gas-tight. Each dish, half filled with water and with the experimental material clamped in position, is weighed and then exposed to the same conditions of temperature, humidity and air movement for a definite time. The ratio of the losses in weight of the dishes gave a measure of the permeability of the various materials. Vickery also found that crinkling or creasing waxed paper increased its permeability very considerably and this fact is a definite objection to a number of papers.

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† Scientific Liaison Officer in London of the New Zealand Department of Scientific and Industrial Research.

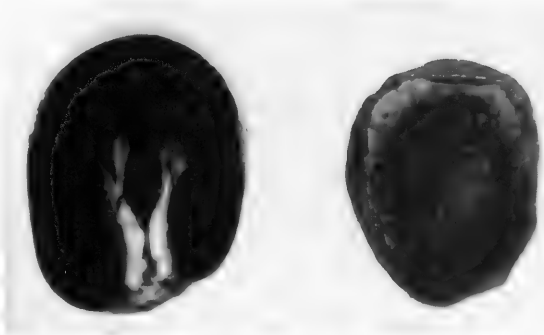

FIG. 2.—Left, kidney wrapped in aluminium foil waxed paper; right, similar kidney wrapped in waxed paper showing extensive withering and store burn.

Combination Wrapping Papers

There are now on the market parchment waxed combination papers consisting of two sheets of paper with a sheet of aluminium foil enclosed. This type of wrapping is now being used with satisfactory results on a large scale for wrapping New Zealand export butter in order to prevent drying and discoloration of the surface, whilst experiment has also shown that it is effective in preventing store burn in frozen offals and poultry. Thus in one experiment a number of lambs' kidneys were frozen at $-10°$ C., and samples stored at the same temperature, (*a*) unwrapped, (*b*) wrapped in waxed paper, (*c*) wrapped in an aluminium foil backed on one side with parchment paper and on the other with waxed paper. At the end of six months, lot (*c*) was in excellent condition and free from blemish, whilst lots (*a*) and (*b*) showed extensive withering and store burn (Fig. 2).

In another experiment 36 chickens were packed into three boxes:

Box I.—Lined with greaseproof paper; heads of birds also wrapped in the same paper.

Box II.—Lined with two layers of aluminium foil paper; heads of birds wrapped in greaseproof paper (Fig. 4).

Box III.—Lined as in Box II., but in addition each bird, including head, wrapped in aluminium foil paper (Fig. 5).

The paper in this case consisted of aluminium foil (0·01 mm. thick) protected on both sides with waxed paper. The three boxes were stored at $-10°$ C. for five months, the birds being weighed before and after storage with the following results:

Box.	*Loss in Weight* (%).
I.	1·88 to 2·99 (av. 2·24)
II.	0·47 to 1·01 (av. 0·72)
III.	0·24 to 0·49 (av. 0·34)

The average weight of the birds was 3 lb. 9 oz.

Examination of the individual birds showed that there was little to choose between those packed in Boxes II. and III., the bloom of which was excellent, with no trace of store burn; on thawing they were indistinguishable from freshly killed chickens. On the other hand, the birds in Box I. showed extensive store burn. Further details of these experiments are published elsewhere.[4]

The physics of the movement of water in, and the evaporation of water from, frozen meat are undoubtedly complex but simply stated; store burn is due to excessive loss of water by evaporation. In the case of offals and small meats, it can be prevented by enclosing the meat in a material impermeable or nearly so to water vapour. An aluminium foil backed with waxed paper is an example of such a material. The factor of cost controlling its use in commercial practice has not been gone into.

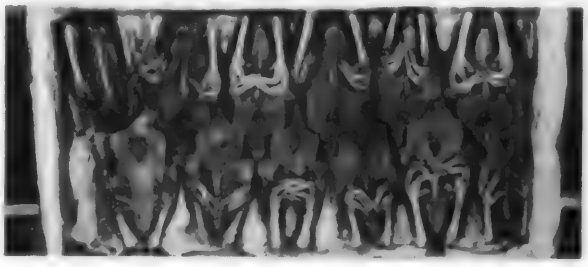

FIG. 4 (above).—Poultry packed in Box II.

FIG. 5 (below).—Poultry packed in Box III.

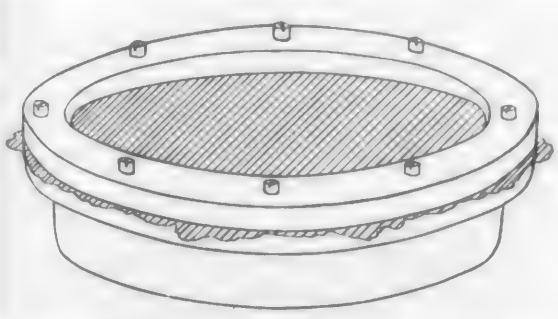

FIG. 3.—Dish used for testing, with sealed flange.

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BRITISH ASSOCIATION
for the Advancement of Science
NOTTINGHAM MEETING, 1937

The British Association meetings are noted for the famous scientists they attract, and for the learned and provocative papers that are read. We publish, in abstract, three papers read at the Nottingham meeting last month that are of interest to the food industry.

GRASS AND THE NATIONAL FOOD SUPPLY

DR. R. E. SLADE (IMPERIAL CHEMICAL INDUSTRIES, LTD.)

THE QUANTITATIVE food requirements of farm animals have been studied far more accurately than have those of man, and as a result they are expressed in somewhat different scientific units. The nutritional needs of a human being are stated in terms of fats, carbohydrates, crude protein, and calories; those of a farm animal in terms of starch and protein equivalents. "Starch equivalent" (S.E.) means the weight of starch that would replace 100 parts of the food as a supplier of energy (calories); and "protein equivalent" (P.E.) the weight of nitrogenous substances (mainly protein) in 100 parts of the food. Thus young, leafy grass has on the average S.E.=56 and P.E.=12—*i.e.*, the "body-warmers and workers" in 100 lb. of it are equivalent to 56 lb. of pure starch, and the crude protein (C.P.) in 100 lb. of it is equivalent to 12 lb. of pure digestible protein. The livestock farmer also distinguishes between the food an animal requires to keep it warm and prevent it losing weight (maintenance ration) and the food it needs to put on flesh or to yield milk or eggs (production ration).

Availability of Grass

Solar radiation is the source of all plant, animal and human energy. It enables the chlorophyll of plants to build up the solid materials in the leaf matter, and these materials, carbohydrates and proteins, have the highest chemical energy; all other processes involved in the plant's life represent stages in the loss of that energy. All the protein value of a crop of grass is present in the young leaves of early spring (say, at the end of May), and though we may leave the crop and not cut it for hay until the end of June, the protein value does not increase. Farm animals prefer grass in the young, leafy, highly nutritious stage. The more fibrous grass of summer is less nutritive and the food it provides has, for milking cows, to be supplemented by feeding-cakes. Following autumn rains, there is usually another flush of leafy grass, and again the heavy-yielding cow can obtain practically all its "fill" from the pasture. In the winter most cattle are fed indoors on hay, roots, feeding-cakes and meals, until spring returns; so that only for a short period is the cow fed entirely on grass. Grassland is most productive in May, June and September; July and August are usually lean months. Yields are also much affected by rainfall, so that in some seasons there is an excess and in others a shortage of grass. Usually, as many animals are kept on a farm as will eat the grass during the leaner summer months.

Quality of Stock-Food

In the post-war period much progress has been made in regulating the amount and quality of stock-food available on pastures by controlling the grazing and by the use of manures. For example, the rotational system of grassland management has shown, *inter alia*, how the grazing season can be extended in spring and autumn by the judicious use of a nitrogenous fertilizer. Mr. Martin Jones, at Jealott's Hill, has demonstrated that bad effects due to added nitrogen result either from insufficient grazing or grazing at the wrong time, so that the coarser grasses grow long and choke the finer grasses and clovers. By regulating the grazing or cutting, and by the use of leafy types of grasses, a succession of nutritious herbage can be obtained during six months in the year; and much better results would follow the sowing of indigenous strains of perennial rye-grass and cocksfoot, such as have been bred by Professor R. G. Stapledon and his co-workers at Aberystwyth.

A problem in urgent need of solution is how to utilise the excess grass that grows during "flush" periods. Excess grass in a mature stage can be made into hay in June or July, but haymaking and maturing in the stack as a rule involve heavy losses, and the resulting nutritive value is low (average C.P. 9, P.E. 3·6, S.E. 35). The high nutritive value of young grass can be well conserved by ensilage, using one or other of the modern methods involving the addition of molasses or mineral acid (average C.P. 15, P.E. 10, S.E. 50); but the nutritive value is best preserved by drying the young grass with artificial heat (average C.P. 15, P.E. 12, S.E. 56). The ensilage and the dried product both retain the valuable minerals and vitamins present in fresh grass; but only dried grass can be marketed.

Protein

Starting in 1935, an investigation has been carried out at Dairy House Farm, near Middlewich, Cheshire, in which the amounts of crude protein obtained each month

as grass for grazing, hay, dried grass, and ensilage have been determined; and from these data the nutrients eaten by the stock have been calculated. The average yields per acre in 1935 were 595 lb. C.P. and 2,277 S.E.; in 1936 (a wetter year) C.P. was 680 lb. and S.E. 2,773. *These totals represent three to four times as much animal food per acre as is obtained on the average grass farm in the country.* The grazing period was extended in spring and autumn and dried grass provided the winter food. There was evidence that the feeding of dried grass in winter raised the winter yield of milk, suggesting that in grass there is a better assortment of amino-acids for milk production than in feeding-cakes. Concentrated feeding-stuffs are not used at Dairy House Farm except for cows giving more than 4 gal. of milk a day; and milk production could be easily increased by more intensive stocking and by feeding-cakes as well as dried grass.

The yield per acre of crude protein, say 700 lb., is equivalent to a yield of 45 lb. of protein as dressed beef, or to 103 lb. protein as milk (300 gal.). Now the average yield of wheat in England is 17·7 cwt. per acre, containing 178 lb. C.P., of which 100 lb. is food for man and 78 lb. is contained in the bran and wheatings as food for beast, so that an acre of grassland at Dairy House Farm is giving about the same amount of food for man in the form of milk as is obtained from an acre of wheat; and it would give far more if Professor Stapledon's leafy strains of grasses were used. Pigs fed on grass protein could provide 70 lb. of pork per acre, but grass is too fibrous for feeding in quantity to pigs. In olden times animals were well fed in summer and half-starved on hay and straw in winter; and men took their protein mainly as cheese made from summer milk.

To-day we seem to need a protein-rich food made from grass containing little or no fibre; a kind of "grass cheese", and if we can now get 700 lb. of crude protein per acre from grass, surely we should be able to get 350-600 lb. of crude protein or 220-400 lb. of P.E. as "grass cheese", as well as carbohydrates. This "grass cheese" would make a very useful food for pigs, and in time of necessity it might supply a nutritious and palatable (?) maintenance ration for the people.

The 9,000,000 acres of arable land of this country if put down to grass might produce enough grass cheese to feed 40,000,000 people, leaving our permanent pastures and rough grazing to keep our cattle and supply meat and milk as extras.

KOLA PREPARATIONS

By Professor T. Atzler

IF THE study of the physiology of the working man is to enable him to benefit it must be concerned not only with his working hours but also with his activities when not at work. In this connection the importance of a satisfactory diet cannot be over-emphasised. The wife of a working man is often ignorant of the best way of spending her resources so as to obtain the best possible diet regarded from the physiological standpoint. For this reason it is appropriate to prepare for the various industrial districts cookery books which may be readily understood. These books should be drawn up with due consideration to the type of food usually consumed in the districts in question and, while keeping in mind the limited resources of those they are to help, should outline purchasing schemes which will provide an adequate, varied and tasty diet.

In drawing up the recipes care should be taken that protein, fat and carbohydrate are present in the right proportions, while a sufficiency of vitamins should also be guaranteed. The content in mineral salts must likewise be kept in mind, the importance of these constituents being more and more clearly recognised in view of their significance in maintaining the bodily powers.

Phosphates

We are aware that the phosphates are able in certain circumstances to increase the output of energy. It is perhaps somewhat incorrect to attribute such an increased output to the action of phosphates, for these salts are natural constituents of our food. It would be more correct to say that if the supply of phosphate in the diet is inadequate then the body's output is diminished. Muscular activity increases the requirements in phosphate more than it calls upon the proteins. If the supply is not forthcoming the output of energy by the muscle will fall. By supplying the body with as much phosphate as was previously available the powers of the musculature are restored to normal. The phosphate-containing foods are dear, so that there is some danger of the poorer members of society suffering from phosphate deficiency. The danger is all the greater since it is unlikely to be recognised. A man may be taking a diet which is entirely adequate in calories but somewhat deficient in mineral salts. This deficiency may only become apparent after weeks or months, when the ready onset of fatigue and diminished ability to perform his work are recognised.

There is a very interesting association between phosphate metabolism and the metabolism of glucose, this being likewise of great practical importance. It is possible, by giving generous amounts of glucose, to reduce the loss of phosphate which follows any considerable muscular activity.

If people are working in hot rooms or in a tropical climate their diet must be so arranged that the loss of sodium chloride is readily made good.

Sodium Chloride Balance

It has often been suggested that workers exposed to great heat should be given salt drinks while at work. This suggestion is not appropriate in all circumstances. If a man is not accustomed to heat it is possible, by

Group at the Nottingham meeting; left to right, Professor Weekley, Dr. E. Poulton, Dr. W. Vaughan, Principal H. A. S. Wortley, Lady Gregory, Professor D. Stamp, Sir Arthur Hill, Sir Josiah Stamp, Sir Richard Gregory, Dr. W. Calman.

administering sodium chloride, to guard against a too rapid loss of salt which, in certain conditions, may cause cramps and serious states of unconsciousness. As he becomes acclimatised to heat the worker's body adapts itself to the new working conditions. A lower sodium chloride balance is set up with a corresponding increase in muscular output. There would be no point in giving salt to a man who had thus accustomed himself to the conditions, for if this were done the circulation would be needlessly overstressed and the temperature raised to no purpose. A fall in working capacity would also occur.

The kola nut is also said to be able to increase working capacity, but, since the nut always contains caffeine, its action has been attributed to an effect on the central nervous system. These statements have required experimental verification in man. The persons chosen for the tests have been brought to a state of fatigue by many hours' strenuous work to begin with and then subjected to further tests to determine the degree of their fatigue. In these they were again required to perform work in the same period of time as one another. The new task was made considerably more tiring than the previous one and the degree of fatigue was estimated from the energy output under the new conditions. It was clearly established that the kola preparation was able to increase the output of work, and it seemed quite likely that this resulted from some action on the higher nerve centres. These centres are concerned with the development of the will and with the staying powers of the individual. Caffeine is not known to exert such an effect, so that it is reasonable to assume that kola products contain some special constituent which acts in this way.

In order to clear up this point comparisons were made between two preparations containing equal amounts of caffeine. One of these contained no kola extract at all. It was shown that the sample which also contained kola was able to increase output far more than the other which had none. The present-day methods for estimating caffeine quantitatively may be adequate, though there are many chemists who do not hold this view. They were used in these experiments, however, and there seems little doubt that the effect of kola is not due entirely to its content in caffeine but is partly explained by the presence of some other constituent.

SOME APPLICATIONS OF ANIMAL EXPERIMENTS TO PROBLEMS OF HUMAN NUTRITION

By A. L. Bacharach, M.A., F.I.C.

ATTENTION IS called to the two separate uses to which animals are put in experimental work connected with nutritional investigations. As knowledge of individual dietary factors increases, the animal becomes less a means for investigating physiological processes direct, and more a reagent for quantitative measurement of the substances involved.

With the increased precision thus available the substances themselves can then be applied in known amounts to problems of human nutrition and disease. Such application may lead in turn to fresh physiological experiments with animals, and the development of new or improved methods of assay.

The conditions under which an experimental animal is used as an assay reagent have to be very rigorously controlled, and can often throw little direct light on problems of human metabolism. Even when an experimental animal is used for more directly physiological purposes, great caution must be exercised in interpreting the results in terms of human physiology.

Calcium-Phosphate Metabolism

Attention is called to the fallacious reasoning upon which certain statements have been made in the field of calcium-phosphorus metabolism. These statements are based upon a misconception of the relationship between animal experiments and their applications to human problems. The statement that "natural vitamin D is more active than the artificial substance", even when any meaning can be given to it, is almost certainly not in accordance with clinically established facts; the belief that the tendency of elderly patients to arterio-sclerosis demands that they shall be deprived of vitamin D, and the view, still prevalent, though no longer held by its original proponent, that certain cereals are actively rickets-producing, are amongst examples of failure to apply correctly, or of actually applying incorrectly, results obtained with laboratory animals.

Strictly speaking, it is never possible to know for certain from the result of an animal experiment that certain results will follow in the field of human medicine or dietetics. Only an actual test can decide. If, for example, aneurin chloride is defined as vitamin B_1, since its effect on rats is undoubtedly the defined effect on them of vitamin B_1, then the question of whether, in fact, beri-beri is a pure vitamin B_1 deficiency can be settled by the administration of aneurin, and of nothing else, to patients with frank beri-beri. If they are not cured, or if their cure is less complete than with, say, rice polishings, aneurin chloride will still be vitamin B_1, according to definition, but beri-beri will be something more than a simple avitaminosis. On the other hand, if vitamin B_1 is defined as the substance that cures beri-beri, and if aneurin chloride does not do so, or does so incompletely, then, by definition, aneurin chloride is not vitamin B_1.

Such facts may seem obvious, but considerable confusion of terminology has arisen through their oversight.

Animal experiments, in spite of all that has been said, are of the greatest possible value in supplying the investigator, both in the laboratory and in human society, with pointers to likely paths of further research. The interplay between chemical, biochemical, physiological and clinical uses of vitamin E preparations—wheat-germ oil and extracts made therefrom—is already throwing some doubt on the earlier views put forward by its investigators and suggesting further work, which is being increasingly prosecuted. It is essential for all four groups, in work of this kind, to collaborate as closely as possible and to understand something of each other's methodology.

It must finally be insisted that the two rôles played by the experimental laboratory animal are fundamental and essential to all progress in knowledge of physiology and nutrition. Without them it would be difficult, if not impossible, either to measure substances or to investigate processes.

ENGLISH CANNING SEASON REVIEWED

Two English canning experts look back on the 1937 fruit and vegetable canning season.

By Mr. W. V. Smedley, Manager of Wisbech Produce Canners, Ltd.

CANNERS ARE just beginning to turn round after an arduous and exceptional season; exceptional by reason of the length of the duration of the strawberry crop and the long-drawn-out pea season. On September 2, I was still canning peas in perfect condition, and I started in the first week of July.

A strawberry season such as we have had this year demonstrated the advantages of a cold store. One firm installed a cold store for peas in bags in which the bags were first passed through a very low temperature oven as a "pre-cool" to prevent heating when stacked in piles. It is evident that cold stores will constitute very valuable aids to the canners.

Most canners have had a disappointing pea season—somewhat drier although longer drawn out than last year. In the cases where farmers drilled again after their first sowings had been washed away, the fact that their peas did not come to maturity until late August proves that peas may be planted in rotation, a fact that many of us doubted, having been bitten once or twice before in trusting to this theory. New varieties of peas are always interesting, and I tried several this year, but for general utility the Lincoln is hard to beat.

New plant, with the exception of pressure cookers, has not been conspicuous. In considering new items, a pea filler and a syruper which would do their jobs without waste would receive immediate attention.

The plum season has belied the law of averages this season. Plums are the fruit that may be canned most quickly and sell most slowly. I believe that most canners are experiencing less trouble from hydrogen swells than formerly. The best cures for these are a good exhaust and a prompt consumption of the goods.

By Mr. A. Lock, Director of Stratford-on-Avon Produce Canners, Ltd.

The season has been characterised by the clean and good quality of the fruit available for canning. A better season for strawberries would be difficult to imagine, and loganberries and raspberries were exceptionally good and free from disease. The sales of raspberries have increased considerably. Gooseberries were late in appearing, due to the concentration of the growers on the more profitable strawberries. The Scotch raspberries handled under our special methods of transport arrived at the cannery in perfect condition.

I have never seen Pershore plums in better condition for canning, in spite of the heavy crop. My company has paid an average price, under contract, of 3s. 3d. per pot throughout the season. Some growers, having realised the benefit of definite contracts, are already signing contracts for the next five years' supplies.

The cannery is now busy packing Victoria plums at the rate of 40 tons per day.

Summing up the season generally, the public may be assured of a pack containing the best fruit that could be produced in England at any time.

Science and Mankind

To all who are in any way concerned with scientific progress, pure or applied, the attitude of science to mankind and *vice versa* is a matter of considerable moment.

Our learned contemporary, the *Manufacturing Chemist*, has opened its columns to a number of distinguished scientists, and in the October issue will present comments and opinions on this important topic from H. G. Wells, Sir Daniel Hall, K.C.B., F.R.S., Sir Richard Gregory, Bt., F.R.S., Professor Lancelot Hogben, F.R.S., and Professor H. Levy, F.R.S.

TECHNICAL CONTROL IN CANNING

by

OSMAN JONES, F.I.C.

Determining pH value.
Photo: Lacheroy, Paris. Courtesy International Tin Research and Development Council.

IN OR about the year 1810 M. Appert, a Frenchman, in order to meet an emergency which had arisen in the food supplies of the French army, and incidentally to win a prize of 12,000 fr., discovered that by hermetically sealing and cooking foods in a container their life could be prolonged indefinitely. It is quite certain that he did not realise that he was the founder of what has by now become a great and important industry in many parts of the world. The growth of canning has been possible only because scientific attention has for many years been focussed upon its diverse and numerous problems. Even now there are a number of difficulties yet to be overcome, some of which call for fundamental research. The canning of food in this country is of comparatively recent date, but in America it may be said to have been started in 1820.

Official Recognition of Research

The importance of the industry from an economic aspect has at last received some measure of recognition in this country. This is evidenced by the encouragement now being given to agricultural pursuits by the Government and by State assistance to the two research stations—that fathered by the Food Manufacturers' Federation, which is specialising in canned meat problems; and the Campden establishment, which is more particularly directing its attention to the canning of fruits and milk. Both stations are carrying out valuable work, and have already done much to place English canned foods in the forefront for quality, but unless their efforts are backed up by adequate technical control in the canning factory itself, it is not possible for the industry as a whole to reap the full benefit of their discoveries.

It is not the purpose of the author to present details of the research problems awaiting solution, but rather to discuss how properly organised control in the cannery will render possible the efficient application of scientific knowledge.

The canned food technologist must be possessed of an expert knowledge of bacteriology as applied to foods, of analytical chemistry and of physics, and also a good working knowledge of engineering, for without these he will be unable to exercise the full technical control which is indispensable for the successful preservation of food.

It is obvious that every kind of food which is capable of being preserved by sealing and cooking in a closed container possesses its own peculiarities—for example, the methods of canning soft fruits and of meat products are almost as diverse as the Poles, and yet they have certain points in common. Both types of food have to be sealed in some kind of vessel, and both have to be heat-treated so as to prevent their decomposition. In the space available it would be impossible to deal with all the different kinds of food which nowadays find their way into cans or glass containers; only the general principles can be laid down, with the possible addition of a special note where the occasion arises. It will be assumed that the factory is fully equipped with up-to-date plant, and that there are also well-furnished analytical and bacteriological laboratories.

Very broadly speaking, there are two items which are involved in the canning of food, namely the raw materials, that is to say the foodstuff, and the container which is to hold them. Associated with these two are a great number of subsidiaries, every one of which has a most important bearing upon the out-turn of the finished product, and therefore calls for detailed consideration.

The Raw Material

It matters not whether this be fruit, vegetable, fish, milk or meat, the essence of its successful handling is to deal with it in the freshest possible condition. Fruits and vegetables should be in the can within a few hours of their being harvested, the American adage "an hour from the field to the can" having more than a modicum

of truth in it. Meat, if it be derived from animals slaughtered on the premises, should receive proper treatment from the minute the animal is killed. Rapid and adequate chilling is highly desirable, and special care must be taken, not only by precautions in the slaughterhouse but at all subsequent stages, to prevent avoidable bacterial contamination. The aim should be to imitate as nearly as possible the conditions of a surgical operating theatre in all those places where the meat is handled prior to its filling into the can. Unless failure is to be courted, the meat must be in an absolutely fresh condition at the time of canning, or preparing for canning. Much the same principles apply to vegetables and fruits. If these are left untouched for a few hours, "heating" or fermentation will set in, and apart from loss of equality in the finished product, the difficulties of the heat treatment to prevent decomposition of the canned food will be greatly increased.

There are quite a number of establishments dealing with meat products which do not carry out slaughtering, and their requirements have to be met by the use of meat slaughtered elsewhere and purchased in the open market, or from premises usually remote from the canning factory. It is open to question whether such circumstances do not indicate the handling of frozen meat in preference to that killed in this country. The average facilities for the slaughtering of animals in England are so far removed from the best scientific and hygienic principles that meat killed abroad and quickly frozen is usually cleaner than the home-produced article, subject to the manner in which it is handled upon its arrival at the place of disembarkation. If transport is rapid, the meat should arrive at the cannery before thawing has had time to commence, and washing and defrosting can be carried out under the same conditions of cleanliness which have previously been emphasised. It should be a very clearly understood principle that the control of food canning starts with the raw material *before* it ever enters the factory. Foods that are not of suitable quality to be eaten when treated in the usual manner are *never* fit to be canned. In fact, it may be said in all truth that food fit for the can should be in better condition than that needed for immediate consumption.

The successful canning of foods depends to a very considerable extent upon the care bestowed upon the material in its initial stages.

The Container

This may be made either of tinplate or glass, fitted with a tinplate lid. In regard to the former, attention needs to be directed to the quality of the tinplate from which the can has been made. There are on the market a number of cans produced from tinplate of indifferent quality, and such are likely to lead to discoloration and perforation. The fault does not necessarily lie with the can-maker or with the tinplate manufacturer; neither of them can be sure of the quality of the tinplate, but both of them are inclined to need "calling to attention" on occasion. There is, of course, indifferent tinplate and bad tinplate, and for the employment of the latter in the making of food cans no excuse can be found. The use of lacquered plate, while it may cover may defects, does not obviate the necessity for the use of good grade material. Careful examination of this very important item must be regarded as a routine job, and only reasonably good quality plate or cans should be allowed on the premises. Precisely the same reasoning must be applied to the lids or caps employed for glass containers. They, too, should be of the best quality obtainable. Where cans are made on the premises, attention must be directed to the possibility of the fracturing of the tin coating in the region where the plate has been subjected to stresses, such as occur in the stamping out of grooved lids. Fractured plate means a relatively large surface of exposed iron and probable discoloration of the finished product.

The fluid used for sealing the joints in the cans also needs examination in the laboratory. If it be of the rubber-in-solvent type, the solvent must possess a boiling point sufficiently low to allow the whole of it to evaporate during the short period the lids are in the drying oven. Furthermore, it should contain sufficient rubber to produce an unbroken film upon the lid. If it be of the emulsion type, care should be taken to ascertain that it is of the desired strength.

The rubber rings used for the closure of glass containers must, when employed for meat products, be examined for the amount of free sulphur which they contain. A limit of 0·05 per cent. should be imposed. Free sulphur in excess of that amount is likely to give rise to black discoloration, sometimes of the lid, and quite often of the meat product upon the surface.

Cans should be thoroughly washed before being filled, for a sufficient length of time to remove any traces of zinc chloride which have been left after soldering. Glasses should also be washed before being filled. It is advisable to carry out the washing at a sufficiently high temperature and for a period that will destroy bacteria in their vegetative form.

Retorting or Processing

This is the most important operation in canning, and unless based upon carefully determined scientific data will lead to heavy loss through spoilage. The essence of success is to base the time and temperature used upon the period needed for the heat to travel to the contents of the can at the *centre*. The figure varies over a very wide range for different materials and different sizes and shapes of container, and must be ascertained for every kind of pack. Too much stress cannot be laid upon the importance of this operation. Methods for the determination of "heat penetration" are described in textbooks and other literature dealing with canning. The process having been laid down, steps must be taken to ensure that the goods actually receive that process in the factory. This can be readily recorded by fitting to the retorts a self-registering thermograph which plots out the heat history of the process. Such records must be examined daily to check operations. Care must also be taken to make sure that the whole contents of the retorts receive an even degree of heat. This can be carried out by inserting clinical thermometers (of the correct range) in cans

situated in various spots in the retorts and, at the conclusion of the operation, the cans are opened and the thermometers examined. Uniformity of heat travel in the retort is brought about by the construction of a small air vent at the top, through which a wisp of steam is allowed to escape when the retort is under steam. The retort should also be fitted with a steam pressure gauge and at least one thermometer. If a steam trap on the retorts is used, it needs attention to ascertain that it is allowing a uniform flow of condensate to pass. If the retort becomes water-logged it ceases to function in the correct manner.

Cooling

The cans, upon removal from the retort, should at once pass to the cooler, which is preferably of the spray type. A point to be remembered is that "cooking" continues until the material at the centre of the can drops to about 150° F., and, in arriving at the proper conditions for sterilisation, cooling rates must be determined in the same manner as rates of heat penetration and due allowance made. The canner's problem, in a nutshell, is how to avoid over-cooking and yet ensure the total inhibition of bacterial action in the finished article.

When goods packed in glasses are being handled it is not possible to cool these in water, and, the rate of cooling in air being slower, the processing time should be adjusted accordingly.

Sometimes difficulties arise in the lacquering plant, the lacquer refusing to coat evenly or being too long in drying. In such cases an examination of the lacquer may reveal the cause of the trouble.

Where the labelling of glasses is carried out by machinery, the consistency of the paste may give rise to troubles, frequently dependent upon the relative humidity of the atmosphere in the room in which the work is taking place. Considerable wastage of time and the cost of re-labelling may be overcome by carrying on the operation in conditioned air, so that the humidity is always constant and the paste or gum can be adjusted to the correct strength to give the best result.

Every batch or lot of goods produced should be coded so that its history can be traced, and the coding should be done upon the container and not upon the label, which is liable to become detached in course of time.

Bacteriological Control

A systematic laboratory examination for the presence of bacteria should be made on at least a 2 per cent. sample drawn from every lot, and this should be accompanied with a "hot-room" test on a further 2 per cent. sample. A period of six days in the room at a temperature of 98° F. is sufficient. Any lot showing a "not sterile" result from the laboratory examination or which shows any evidence of blowing in the hot-room, should be set aside for further examination and, if necessary, destruction. No cans or glasses of food should be permitted to be sold until they have been certified as free from the danger of bacterial spoilage. It should be noted that there are a number of species of bacteria which will cause decomposition of food without the production of sufficient gas to cause a blown condition of the can. For this reason a hot-room test for "blowers" cannot be considered adequate, laboratory confirmation of soundness being also needed.

Even in the most carefully conducted factories, trouble from bacterial spoilage occurs, and when this becomes frequent it is necessary to make a complete bacteriological examination of the spoilt material in order to find out if the trouble is arising through the activity of a particular variety of micro-organism. When this is shown to be the case, it may usually be traced to infection of the material in one department of the factory, and drastic disinfection must be carried out. Of course, the daily sterilisation of all utensils, etc., must invariably be undertaken.

The tracking down of a specific bacterial infection is nearly always a troublesome and difficult task, and such infection should be avoided by the utmost possible cleanliness, the lack of which may lead to the loss of much money; then there is always the risk of unsound goods finding their way into the market, and causing outside trouble.

Analysis of Raw Materials

The usual analytical tests for purity of all materials must be carried out, particular attention being directed to suitability of quality and conformity with the existing Regulations (Food and Drugs [Adulteration] Act, 1928). This last remark applies particularly to materials purchased from outside sources, such as sugar, gelatine, artificial colours, spices and so forth.

The technologist, in order to keep in touch with all the points which arise in the cannery, must have his laboratory properly organised, and be able quickly to check faults when they arise. He must be prepared to spend at least as much time in the factory as in his office or laboratory; for only by personal observation is it possible to exercise efficient control.

PIGS, A SOURCE of INFECTION

ACCORDING to R. Vedel (*Thèse Paris*, 1936, No. 734), as reported in a current issue of the *British Medical Journal*, the European *B. suipestifer*, the American *B. suipestifer*, and the bacilli of Eastern Europe of the Hirschfield type are closely related to one another but are not identical. In only very rare cases has the American *B. suipestifer* been found in man, whereas the European *B. suipestifer* has been found in cases of food poisoning, diseases resembling paratyphoid, septicæmia, and miscellaneous diseases such as arthritis, enteritis, and abscesses. Cases of this kind have occurred in Europe, especially England, and in America. The two possible sources of infection are the fæces of pigs and the meat of these animals when affected with swine plague and even non-specific infections. The departments in which pork is prepared for consumption should therefore be kept at a distance from slaughter-houses, and as far as possible the slaughtering on the one hand and the preparation of food on the other should be carried out by different sets of workers.

INDUSTRIAL NOTES

New Appointments

Enamelled Metal Products Corporation (1933), Ltd., manufacturers in this country of "Pfaudler" glass-lined steel equipment, inform us that Mr. S. B. Court, who for several years has been attached to their Advertising Dept., has now been transferred to their Sales Staff. He has been allocated to the southern and south-western districts of England. At the same time they announce a newcomer to their Sales Staff in the person of Dr. J. M. Pirie, B.Sc., A.R.C.S., D.I.C., Ph.D., who has been given a territory generally covered by the southern Midlands.

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W. H. Sessions—Football Vice-Chairman

Mr. William H. Sessions, of W. H. Sessions, Ltd., the well-known York manufacturers of embossed seals, has been elected vice-chairman of the York City Football Club—now in the third division of the Football League.

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Wallace Beveridge leaves Scotland

Mr. Wallace Beveridge, of Cowdenbeath, has received an appointment in London with Allen and Hanbury, manufacturers of the well-known tonic food preparations, and has left Scotland to take up his new duties.

Mr. Beveridge was trained with the drug department of the Dunfermline Co-operative Society.

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Coming Events

October 4-16.—International Exhibition of Inventions, Central Hall, London.

October 12-30.—Twelfth North London Exhibition, Alexandra Palace, London.

October 19-22.—National Dairy Show, Olympia, London.

October 19-22.—Craft in Industry Exhibition, Chelsea Town Hall, London.

October 19-28.—National Fruit Show and Canners' Exhibition, Bingley Hall, Birmingham.

Sue for Infringement of Patents

Dewey and Almy Chemical Co. of Canada, Ltd., have brought suit in the Exchequer Court of Canada against distributors of certain canned foodstuffs imported from Japan alleged to be sealed with sealing compounds which infringe their patents. A restraining injunction against further importation, as well as damages and other relief, are being sought by the plaintiff.

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German Synthetic Fat Tried Out on Prisoners

German chemists have succeeded, we understand, in manufacturing a high quality artificial fat out of wood. Experiments were conducted at Oberhausen some time ago with a view to producing a fat from the carbon and glycerine obtained from wood.

The first result was a grease suitable for machinery. The patent was taken over a year ago by I. G. Farbenindustrie, the chemical dye trust, and exhaustive experiments were carried out in the endeavour to refine the substance for edible use.

Quantities were sent to several German prisons to be tried out among the inmates.

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New German Canning Plant

A. G. Wickman, Ltd., Coventry, advise us that L. Schuler, A.G., Goeppingen, Germany, for whom they act as the sole agent in this country, have recently completed an entire redesign of the whole of their canning plant, and have published a complete, up-to-date catalogue on almost every type of machine used in the canning industry. This catalogue is at the moment only printed in German, but it is being translated and will be available in English in the course of the next month or so. Upon request they will be pleased to supply a copy to any firm interested.

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Fire at Refrigeration Works

A new office block was gutted and much damage done at the works of J. and E. Hall, Ltd., Dartford, when fire broke out on September 7. Office staff had to be drafted into other buildings temporarily, but production was unaffected, and business is being carried on as usual.

Team Valley Estate Passes its Half-Century

Despite the caution which made its chairman warn the Government that they would be lucky to establish six factories on their trading estate in the first year of work, North-Eastern Trading Estates, Ltd., has succeeded in securing fifty industrial tenants since last October.

This achievement is a feather in the cap for all concerned with this great Government effort to relieve unemployment, and a convincing reply to those who have said that light industry would never enter the North-East Special Area.

Among the firms who have undertaken to take factories are nine food manufacturers; some of these firms have expanded from other parts of the country, but others represent entirely new industries which have been started with the help of capital subscribed by Special Areas Reconstruction Association, Ltd. (S.A.R.A., Ltd.). It is estimated that the fifty factories will employ 3,000 workpeople by the end of their first year in production.

The engineering development of the estate has proceeded apace and to-day, with its main and intersecting roads, its light railway, and its open spaces for employees, it commences to take the form envisaged by the Consulting Architect, Professor W. G. Holford, one of Britain's foremost exponents of industrial planning.

Enquiries for factory sites are maintained to such an extent that the hours of daylight are too few, and flares on the estate turn night into day, mingling with the lights streaming through factory windows, as builders and tenants press forward with their activities.

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Change of Address

The London office of Partridge, Wilson and Co., Ltd., makers of Wilson electric cars and Davenset battery chargers, has been changed to Sentinel House, Southampton Row, London, W.C. 1. Telephone No. Holborn 9200. This office as heretofore will deal with all sales matters. All communications regarding service or spare parts for Wilson vehicles and chargers should, however, be sent direct to their head office at Leicester, telephone 24882.

MATERIALS, PLANT and EQUIPMENT

Exhibits at the National Dairy Show

At the National Dairy Show, Olympia, this month, Short and Mason, Ltd., will make a special display of measuring and recording instruments for the dairy industry.

An outstanding instrument is the latest type Short and Mason volumetric recording (or indicating) pressure gauge, designed for operation with ice-cream homogenisers. Completely hygienic, it differs from existing types inasmuch as the system is entirely closed, only a smooth, easily cleaned bulb in a stainless steel well being exposed to the product, so constructed that pressure fluctuations, no matter how great, cannot injure the mechanism or affect its accuracy. Normal pressure range, 0 to 5,000 lb.

Two new types of humidity controllers will be exhibited for the first time. These are a direct reading combined humidity and temperature recording controller, and an indicating humidity controller. Both instruments are fitted with special humidity elements unaffected by temperature variations, operating on a magnified link motion which immediately transmits humidity changes into pen arm action.

Short and Mason will also have on view at their stand a representative selection from their well-known range of temperature recorders, indicators, and controllers.

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Alfa-Laval at Engineering and Marine Exhibition

Alfa-Laval Co., Ltd., exhibited a complete range of their well-known De Laval Centrifugal Purifiers and Separators.

The machines incorporate a number of outstanding improvements in centrifugal design, and particular emphasis should be laid upon (1) direct drive from standard horizontal shaft motors, (2) totally enclosed fume-proof covers with sight glasses for oil and water discharge, (3) self-draining bowl, (4) ball-bearings on all shafts and automatic lubrication to all bearings, (5) mechanical bowl handling gear, (6) positive washing and self-sludging bowl, allowing very long runs to be obtained before bowl cleaning is necessary.

De Laval centrifugal oil purifiers are manufactured in a wide range of sizes having outputs of 20 to 4,500 gallons per hour, and are widely used for the purification of animal oil, fish oil, vegetable oil, separation of yeast and starch, and many other industrial uses.

Two machines of special interest are the newly designed De Laval FD 12 fruit juice clarifier, and the De Laval hermetic clarifier which enables liquids to be centrifuged under pressure out of contact with air.

A staff of fully qualified engineers and chemists were in attendance at the stand throughout the Exhibition to give visitors information and to discuss any problems.

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Refrigerating Plant in a Restaurant

The Pulsometer Engineering Co., Ltd., of Reading, have completed an interesting refrigeration installation at James Fleming's Restaurant in Oxford Street, London.

The plant is primarily required for the storage of salads and jellies, and the service cabinet accommodates some 540 dishes. A partition divides the internal cabinet into two sections, one small and one large, so that certain foods which might taint the remainder can be stored separately.

The cabinet is insulated with 4 in. of slab cork; the exterior is panelled, the interior is lined with stipple glaze, and all shelves are removable.

The overall size of the cabinet is 15 ft. 3 in. long by 3 ft. 2 in. deep by 6 ft. 7 in. high, the automatic methyl chloride air-cooled refrigerator being mounted on top. The coolers inside take the form of copper sheets to which are permanently fixed the copper cooling coils themselves, and the arrangement is designed to allow a continuous circulation of cold air throughout the cabinet.

The temperature maintained inside the cabinet is 40° F., but this can be varied as desired. Dial thermometers are fitted to the outside of the compartments so that the temperatures maintained can readily be noted.

The whole installation is fitted in close proximity to the kitchens, and it will be realised that the conditions from the temperature point of view are not in favour of the refrigerator. Nevertheless, the plant is well able to maintain the required low temperature inside the compartments, whatever may be the outside temperature.

Steam Turbines: Application for Rope and Belt Driving

The steam turbine has now reached such a stage of reliability that it is suitable in all sizes, less than 100 h.p. if required, for all applications in food factories, not only for equipment such as electrical generators, pumps, and fans, but also for general rope and belt driving.

The advantage of the turbine as against the steam engine include small size and weight, extremely accurate speed control, uniformity of turning motion, and flexibility in the arrangement of the drive, which can be of the direct coupled gear, rope or belt variety, either separately or together in any desired combination.

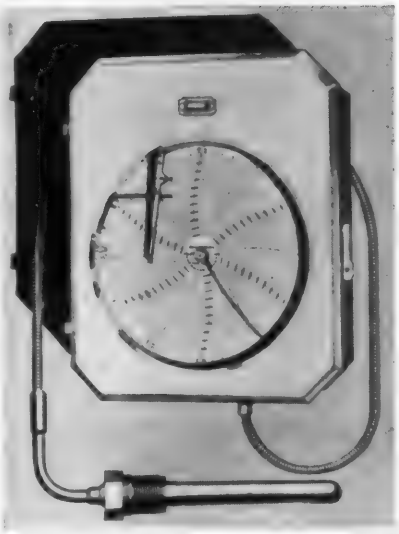
Considerable interest attaches, therefore, to a number of industrial turbine drives by Hick, Hargreaves and Co., Ltd., of Bolton, who specialise in impulse turbines of all types, in sizes within the range of 20 to 4,000 h.p., and have been engaged in mill driving for over a century.

A typical example is a 600 kw. condensing turbine operating at a factory under conditions of 170 lb. per sq. in. pressure and 500° F. superheated steam temperature at the stop valve, with also a vacuum of 28½ in. mercury, the speed being 6,000 revolutions per minute. This turbine drives a 300 kw. alternator through reduction gearing, and the balance of the power, about 400 h.p., is used for rope driving; the main pulley, with a friction clutch, is on the end of the alternator shafting, the speed being 375 revolutions per minute. There are 22 rope grooves on the pulley.

An important point to remember is that the industrial turbine is a different proposition from the large power station unit, since the general conditions in most works are very different. Due allowance for this is made in the "Hick Hargreaves" turbine, while all vital parts can be opened up separately and examined during the week-end. This is essential, as no stand-by main generating plant is usually available in an industrial establishment and a turbine that is a smaller edition of an intricate and inaccessible power station set may give rise to serious trouble.

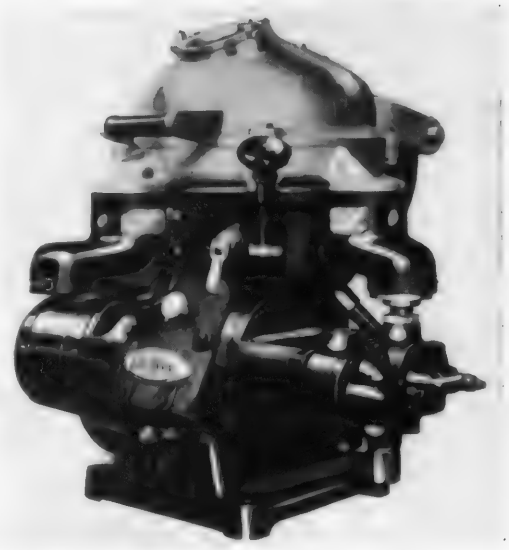
Because, in practice, the industrial turbine is often suddenly started up and brought on to full load in an extremely short period of time, "Hick, Hargreaves" turbine disc wheels are mounted separately on the shaft, with a pair of mounting rings that

(*Continued on page* 356)



(Left) *The latest type Short and Mason volumetric recording pressure gauge, specially designed for hygienic use with foodstuffs. Material—stainless steel.* *See page 354.*

(Right) *The new FD 12 De Laval fruit juice clarifier, exhibited for the first time at the Engineering and Marine Exhibition.* *See page 354.*



"Hick, Hargreaves" 600 kw. condensing steam turbine running at 6,000 r.p.m. with steam at 170 lb. per sq. in., and 500° F. A vacuum of 28⅓ in. mercury operates a 300 kw. alternator and the rest of the power is used by a rope drive. *See page 354.*

A Cambridge moisture tester, based on the fact that the presence of absorbed moisture increases the dielectric constant of a material. Suitable for powdered and granular foodstuffs. *See page 356.*

The above pictures, taken by a FOOD MANUFACTURE *staff photographer, illustrate an interesting engineering job recently carried out by the G. C. Engineering Co., Ltd. The machine is a delevator, installed at the premises of Santiago Neuhofer, fruit brokers and importers, Spitalfields Market, London. It is used mainly for the handling of cases of oranges, and either lowers them from street level to the cellar, or conveys them from the cellar to delivery vans on the street level. The cradles that carry the boxes are mounted on an endless chain, which travels slowly over gears at top and bottom. Thus if any hitch occurs at the unloading end of the conveyor, cases which are not removed from their cradles are merely carried over the top, or under the bottom, as the case may be, and come round again for removal on the next journey. Previous to the installation of this delevator, cases had to be lowered down a chute, and hauled up again when required. The new method saves much time and floor space, as well as being far less strenuous. The left-hand picture shows the delevator in the cellar; two boxes are on the way up to the floor above. In the right-hand picture a box has just reached the street level, and is ready to be unloaded.*

allow ample clearance between the discs.

A 2-spring centrifugal governor also is installed with double-beat governor valves, along with auxiliary governor to prevent over-speeding, while if head room is a main consideration the condensers can be built at the side instead of underneath.

▼ ▼ ▼

Dry Flavours for Powdered Products

Nearly two years of thorough testing, checking, and cross-checking; test consignments sent through the tropics, round the world, and back again; thus did Boake, Roberts and Co., Ltd., test their new "Drydex" flavours before launching them on the open market. Now they are able to say that "Drydex" flavours will withstand any ordinary exposure, handling, and exposure to climatic conditions without losing strength.

These flavours are in powder form, each grain being sealed, as it were, in a protective skin. Thus, only when the flavouring powder is dissolved is the full strength released. Makers of custard powders, jelly crystals, and other dry processed foods will be quick to recognise the merits of a dry flavouring substance that is stable. Mixing is easy, and a uniform flavour throughout the product follows automatically.

Some idea of the strength of "Drydex" powdered flavours may be gained from a suggested recipe for raspberryade crystals; for every 100 lb. of sugar, the quantity of "Drydex" raspberry required is from 2 to 3 oz. Jelly crystals take 4 to 8 oz. of "Drydex" per 90 lb. of sugar.

Some fifty flavours are available, including meat and spice varieties for sausages and butchers' small goods.

▼ ▼ ▼

Cambridge Moisture Tester

This instrument has been designed to facilitate rapid measurements of moisture content of materials such as tea, grain, or any powdered or granular substances which are electrical insulators in the dry state. The principle of measurement is based on the fact that the presence of absorbed moisture increases the dielectric constant of the material. A condenser in the form of a container is packed with a known weight of the material to be tested and inserted in one arm of a condenser network; its capacitance is then balanced by a calibrated condenser, the reading on the latter giving an indication of the amount of moisture present. A self-contained battery is provided; the instrument is portable and always ready for use.

For accurate work it is first necessary to plot a curve showing the relation between the instrument reading and the actual moisture content as determined by the oven-drying method. A complete series of readings can be taken on one sample by making a test at intervals during the drying process. This curve will enable the readings on the instrument to be interpreted in values of moisture content on any further samples of the same material, but it will not necessarily hold good for other materials, which, when dry, have a different dielectric constant.

Six blank scales are provided with each instrument, which may be marked in terms of moisture content as determined by oven drying, thus providing a direct reading instrument for use on definite materials. For many purposes this procedure will be found very satisfactory.

UNFERMENTED FRUIT JUICES—(*Continued from page 341*)

price for pressure tanks and the delay in separation, especially in the case of grape juices. It may be gathered from the growing application of this method, however, that the advantages outbalance the disadvantages. Unfermented fruit juices should not be stored in the turbid condition as they come from the press, but should be subjected to thorough preclarification and have diminished germ contents. The drawing-off of the unfermented fruit juice according to the EK method should take place under absolutely aseptic conditions.

Thorough prior soaking and cleaning of the bottles is a prime requirement. The bottles should be disinfected immediately before bottling, generally with 2 per cent. sulphurous acid, which is afterwards removed by rinsing with sterile water. Direct addition of SO_2 is not permitted in the case of apple juice, but is necessary with grape juice to prevent it turning brown. The drawn-off juices are permitted to later contain at the most 100 mgr. (with apple juice) and 125 mgr. (with grape juice) per litre.

Comparative Analyses

It is sometimes claimed that with the cold process, owing to the required clarification and the thorough filtration, valuable constituents are eliminated from the unfermented fruit juice, which remain in the pasteurised and unfiltered juice. This induced the reporter to conduct comparative analyses and ferment-physiological tests. There were tested:

1. The original fruit juice as it comes from the press.
2. The pasteurised and unfiltered fruit juice.
3. The gelatine-treated fruit juice filtered by the EK filter.
4. The fruit juice treated with "Filtragol" and filtered with the EK filter.

Determining the specific weight, the total extract, the fruit sugar and the fruit acids failed to show results in favour of one or the other method.

This also applies to the comparative ferment-physiological tests conducted with unclarified and thoroughly filtered juices.

WAX CONSTITUENTS of EXPRESSED GRAPEFRUIT OIL

THE oil obtained by cold-pressing the peel of Florida grapefruit (*Citrus grandis*, syn. *C. decumana*) was examined by Nelson and Mottern (*Ind. Eng. Chem.*, 1934, **26**, 634). The non-volatile residue represented 7·5 per cent. of the original oil. This waxy residue has been examined and found to contain solid and liquid fatty acids, two high hydrocarbons, two ketones, and phytosterol. It is suggested that the waxy residue had its origin in the cuticle wax of the fruit, and that it was dissolved by the oil during the pressing.

K. S. Markley, E. K. Nelson, and M. S. Sherman, *Journ. Biol. Chem.*, 1937, **118**, 433.

TRAINING of FOOD TECHNOLOGISTS

REFERRING to an appeal made in 1935 in this country for the establishment of a university course of instruction in food technology, B. E. Proctor, of the Massachusetts Institute of Technology, writing in *Food Industries*, May, 1937, describes the four-year course of that institute, and stresses that it designed not to train food technicians but rather *food technologists*. It is intended to produce technically trained men who see the food industries as a whole—not men who see just the dairy, or the canning, or the milling industry, and are expert in that to the exclusion of all others. The course has been successful since its inception, and there exist good futures for such trained men, concludes Mr. Proctor.

CORRECTION

IN the article by Mr. Basil E. Bailey on "The Antirachitic Value of Canned Salmon" (published in FOOD MANUFACTURE, April, 1937, page 134, second column) line 2 should read "found to be respectively 1,700 and 880 international units".

FOOD CONTAMINATION in AERIAL WARFARE

By J. D. Devey

THE OBJECT of using stannic chloride or arsenic chloride in conjunction with phosgene in aerial bombs, is that when the gases come in contact with food, the moisture present will cause the gases to react chemically with each other, producing poisons which adulterate the food and render it unfit for human consumption.

In the case of phosgene-with-stannic chloride, stannic acid is liberated. In the case of phosgene-with-arsenic chloride, arsenic acid is liberated. Both substances are very poisonous.

The following equations represent the reactions occurring between the phosgene, water and either arsenic chloride or stannic chloride:

(I.) $2COCl_2 + 4AsCl_3 + 16H_2O + O_2 = 4As(OH)_3.H_2O + 16HCl + 2CO_2$.

(II.) $2COCl_2 + SH_2O + SnCl_4 = SnO_2.H_2O + 8HCl + 2CO_2$.
Phosgene. Stannic acid.

After an aerial attack in which gas bombs containing phosgene or either stannic chloride or arsenic chloride are used, food which has been allowed to come in contact with such gases must be destroyed immediately, or serious cases due to arsenic acid and/or tin poisoning will occur.

The only way to keep food fit for human consumption during aerial gas attacks is to shelter it by suitable material which will either prevent the gases from reaching the food or else render the gases innocuous.

SANITARY INSPECTORS' ASSOCIATION

JUBILEE CONFERENCE, BRIGHTON

August 30—September 4, 1937

Sir Leonard Hill.

THE PRESIDENTIAL Address was given by Sir Leonard Hill, M.B., F.R.S., LL.D., Hon. A.R.I.B.A.

In reviewing the work of the Association of Sanitary Inspectors, the President mentioned the work of the Rockefeller foundation and cited its work in the Philippines as a striking example. He stressed the need of education in the science of biology as a counterweight against the exploitation of the discoveries of the chemist and physicist by the makers of armaments. He reviewed birth-rates, and drew a rather doleful picture of a nation of dodderers which would exist in thirty years' time if the present trend is to be followed. Not only in England, but in Australia, New Zealand, Germany, and France is the replacement of population below maintenance level. Italy, Canada, and U.S.A. are still about the maintenance level. In Russia, on the other hand, the population is increasing at the rate which will soon be seven million a year. In Japan it is increasing by about a million.

Diet Standards

Sir Leonard commented upon the diet of the Japanese, which contains no more than a third of the energy which the Committee of the British Medical Association has declared is needed by us, a figure put, in his opinion, at least one-third too high when a properly chosen diet is eaten. The need for improving the birth-rate is vital. Germany and Italy are making organised efforts in this direction.

The influence of diet must be taken into account, and it was pointed out that city people live largely on a diet which contains about a third of the lime, phosphorous and vitamin needed for vigorous health.

On the same day Mr. Stewart Swift (Oxford) read a paper on the "New Procedure Under the Public Health Act, 1936."

On Wednesday there were interesting discussions on "The Factories Bill, 1937", introduced by Mr. G. D. Kirby, of Norwich, and on "Public Cleansing, with Special Reference to Salvage and Trade Refuse", introduced by Jas. F. Rogers, Chingford. Among the items treated by Mr. Rogers figured an interesting analysis of the proportion of used tins delivered at a disposal works. Empty fruit tins accounted for 27·5 per cent. of the total; milk tins 17·8 per cent., and fish tins 10·0 per cent.

Meat Inspection

On Thursday, September 2, there was a discussion on "Meat Inspection, with Special Reference to Memo 26 (Foods)", introduced by W. B. Calder, Chester. He stressed the onerous nature of his duties and mentioned that he may have received notices of intention to slaughter on premises miles apart and times of slaughter fixed for the same hour on a particular day. Mr. Calder referred to Memorandum 62 (Foods), which comprises a system of meat inspection recommended for adoption by local authorities and their officers. The recommendations are briefly as follows:

Paragraph A. Wherever practicable, ante-mortem inspection should be undertaken of all animals prior to slaughter.

Paragraph B. Devolves on butchers and slaughtermen certain obligations, amongst which are the stripping of serous membranes only under the supervision of a meat inspector, the sterilisation by boiling of the wiping cloths used in the process of dressing carcases found to be diseased, the detention of carcases and viscera presenting lesions of disease, pending inspection.

Paragraph C. Gives general instruction to inspectors in which it is recommended "that every effort should be made to inspect all carcases and viscera of all animals slaughtered within the area". The inspector stated that these recommendations cannot be carried out efficiently under present conditions, for there are still in existence too many private slaughter-houses, both in boroughs and rural districts.

Paragraph D. In this, various sections prescribe general principles to be observed in the examination of carcases. Mr. Calder stressed the necessity to pursue a constructive policy and to urge for progress in this work.

Milk Supply

A second discussion on the "Milk Supply from the Aspect of the Consumer" was opened by Mr. D. Boyd, M.S.I.A. The speaker covered such questions as to the amount of milk consumed in Great Britain; progress in milk advertising; the consumer's demands; bacteriological content; winter and summer prices; the consumer's responsibility as regards the cleansing of milk bottles; the efforts towards safer milk and the eradication of tuberculosis and for increased veterinary and sanitary services and regional milk depôts.

The Conference proper closed on September 3 with a Social and Dance in the Royal Pavilion.

INFORMATION and ADVICE

Diacetyl in Margarine—Sausage Binders—Marketing of Provisions—Fruit and Vegetable Canning—Treatise on Wine Manufacture—Do Herrings Change Their Spawning Grounds?

Diacetyl in Margarine

FOOD AND DRUG ACT REGULATIONS

2,199. *We understand that the authority which administers the Food and Drug Act allows an addition of diacetyl to margarine. We should be grateful for any information on this subject which you would be in a position to give us, namely, the quantity, if any specified, and the name of any other products of a similar nature which might be in general use.* (Croydon.)

In reply to your enquiry, we have been unable to trace any ruling on the point as to what quantities of diacetyl may or may not be added to margarine. We understand, however, that if an optimum amount is exceeded, the keeping quality of the margarine is injured.

We can furnish you with the name of the suppliers of diacetyl, should you so wish, who doubtless will be able to give you advice as to its properties, which are used for flavouring purposes.

Sausage Binders

2,204. *We are producers of biscuit rusk, sometimes called sausage binder or sausage meal, and while we make a very high-grade binder some of our competitors produce a similar article giving a texture when soaked which our binder does not possess. Although this peculiarity in our competitors' product is desirable from a selling point of view it nevertheless makes no difference in the finished sausage product.*

Our representatives, however, are very anxious that we should procure the particular texture referred to, which consists of a freedom in the meal when water is added in the proportion of two to one in weight, that is to say, two parts of water to one of meal. In our product, after the addition of water, the meal coagulates and is inclined to become sticky when stirred up by the fingers for some little time. Our competitors' meal again remains free and does not coagulate when so stirred up. (Edinburgh.)

We have given considerable attention to the points which you raise, but are unable to offer any suggestions in the matter of additions to sausage binders.

Your letter prompts us to suggest that you place the matter in the hands of a competent analyst for investigation. (We can recommend such an analyst if desired.) You will, of course, appreciate that we are not equipped to conduct lengthy experimental work of this nature.

Marketing of Provisions

2,216. *I shall be obliged if you will kindly let me know the titles, price and where obtainable of any books dealing with the manufacture and marketing of provisions (particularly bacon and cheese) and of cooked meats—giving recipes for the latter, particularly for various styles of sausages.* (Nottingham.)

I would suggest that the bibliography in *Food Industries Manual* is the most comprehensive one relating to the food industries, and this will also give you information on the manufacturing side, which you will no doubt require. The 1937 edition, which is now available, has been brought completely up to date. The manual is obtainable from this office.

Fruit and Vegetable Canning

2,218. *We shall be glad if you would let us have some information regarding the canning of fruit and vegetables, more especially cherries, strawberries and peas. We should also like to know if it is possible to obtain and, if so, from where, fruit and vegetables which have been processed and require only canning and sterilising.* (Devonshire.)

You will find the canning of fruits and vegetables very fully described in the Canning Section of *Food Industries Manual*, the 1937 issue of which is available, and which has been brought fully up to date.

We shall be pleased to supply you with a copy of this. With regard to the obtaining of fruit and vegetables already processed and requiring only canning and sterilising, we do not think this is possible.

Treatise on Wine Manufacture

2,236. *I am looking for a comprehensive and thoroughly detailed treatise on the subject of wine manufacture, published either in English or the German language.* (India.)

With reference to your enquiry, we would state that *Food Industries Manual*, published by us, contains information concerning all branches of food manufacture. In addition, it contains an extensive bibliography of technical books which may prove of value to you.

Do Herrings Change Their Spawning Grounds?

2,267. *I am a university student and have to write a thesis on "The Herring and its Relation to Great Britain". My greatest difficulty lies in finding evidence that the herring changes its spawning grounds, and the effect of this on fishing.* (Manchester.)

We regret that we are unable to be of much assistance to you in your enquiry.

The only information we have published on this subject was in an article entitled "The Common Herring", by Elliott B. Dewberry, in our issues of March, April and June, 1936.

Materials and Equipment Required

We have received enquiries concerning the suppliers of the following equipment and materials, and suitable recommendations have been made.

2,214. *Firm advertising "Redro" fishpaste, which contains eight distinct kinds of sea-water fish.* (Norway.)

2,228. *Book dealing with manufacture of rusk for sausages.* (Liverpool.)

2,245. *Firm packing "Tripe à la mode de Caen".* (London.)

2,263. *Firm who manufacture hygienic cans referred to in January 15 issue of* Food Industries Weekly. (Guildford.)

2,265. *Manufacturers of cellulose containers.* (Dunbar.)

2,328. *Books giving rules and regulations for mineral water manufacture.* (London.)

2,329. *Books containing formulæ and methods of manufacture of flavours and essences.* (B. A. B. Aust.)

2,337. *Literature available on wheat germ oil.* (New Zealand.)

2,553. *Makers of wrapping machines for cubes.* (London.)

2,262. *Suppliers of frosted fruits.* (London.)

2,554. *Material to incorporate with the starch to improve its performance as a machine paste.* (Buenos Aires.)

2,558. *Machines for filling Mono containers.* (British West Indies.)

2,562. *Books on the examination of caffeine.* (Gloucestershire.)

2,564. *Suppliers of preparations of Annatto.* (Bruxelles.)

2,566. *Manufacturers of milk preparation known as "Coldmix".* (Reading.)

2,582. *Official and tentative methods of analysis of the American Association of Official Agricultural Chemists.* (India.)

2,629. *Matzka's sterilisation apparatus.* (London.)

2,208. (1) *Machinery relating to the manufacture of jams and jellies.* (Dundee.) (2) *We are desirous of obtaining the latest literature regarding the manufacture of jams and jellies.*

We think you cannot do better than refer to the subject in the *Food Industries Manual*, published at this office, wherein the subject is dealt with exhaustively.

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NEW COMPANIES

Balkan and Colonial Produce Agency, Limited. (331426.) Registered September 9, 1937. Ibex House, Minories, E.C. 3. To carry on the bus. of dlrs. in merchandise of all kinds, etc. Nom. Cap.: £500 in £1 shares (449 "A", 50 "B" and one "C"). Dirs.: A. Boucos, 9, Garway Road, W. 2 (permt.); F. Leighton, 60, First Avenue, Queen's Park, W. 10; Mary Wellman, 9, Garway Road, W. 2.

Bush Milkbars, Limited. (331391.) Registered September 8, 1937. 11, Brewer Street, W. 1. To carry on the bus. of caterers, proprs. of milk bars, etc. Nom. Cap.: £1,000 in £1 shares. Dirs.: F. Mason, A. Allam and G. Saines, addresses not stated. Subs.: K. E. Beart, Amberley House, Norfolk Street, W.C. 2 (solr.); E. Versluys, Amberley House, Norfolk Street, W.C. 2 (clk.).

Chubb's Restaurants, Limited. (331233.) Registered September 2, 1937. Chubb's Restaurant, Chapel Road, Worthing. To carry on the bus. of refreshment contractors, restaurant keepers, etc. Nom. Cap.: £1,000 in £1 shares. Dirs.: T. A. Chubb, 48, Stoke Abbott Court, Chapel Road, Worthing; Mrs. J. C. Chubb, 48, Stoke Abbott Court, Chapel Road, Worthing. Remun. of dirs.: As voted by the company.

T. S. Crouchman, Limited. (331459.) Registered September 9, 1937. To carry on the bus. of caterers, proprs. of hotels, restaurants, etc. Nom. Cap.: £750 in £1 shares. Dirs.: H. Macdonald, Mrs. Alice Macdonald and Mrs. M. Viliani, addresses not stated. Subs.: M. Fitzpatrick, 17, Broadway Avenue, St. Margarets, Twickenham (clk.); A. J. Buck, 70, Ilex Road, Willesden, N.W. 10 (clk.).

Findon Manor, Limited. (331317.) Registered September 4, 1937. 3, St. James's Square, S.W. 1. To carry on the bus. of hotel, restaurant, refreshment and tea room proprs., etc. Nom. Cap.: £1,000 in £1 shares. Permt. dirs.: W. M. Macleod, 7, Shepherd House, Shepherd Street, Mayfair, W.; J. C. Allan, 73, Vandon Court, Petty France, S.W. 1; G. P. Russell, 12, Yeoman's Row, S.W. 1. Remun. of dirs.: £150 per annum divided between them.

F. Harrison (Newton Heath), Limited. (331396.) Registered September 8, 1937. To carry on the bus. of grocers, provision mchts., etc. Nom. Cap.: £5,000 in £1 shares. Permt. dirs.: Mrs. E. Harrison, 778, Oldham Road, Newton Heath, Manchester, 10; P. H. Sellers, 584, Oldham Road, Newton Heath, Manchester 10. Qual. of dirs.: Ten ord. shares.

J. Hebblethwaite, Limited. (331285.) Registered September 3, 1937. To carry on the bus. of mnfrs. of and dlrs. in confectionery, ices, cooked and prepared foods, etc. Nom. Cap.: £4,000 in £1 shares. Dirs.: W. A. Yeomans, 111, Millhouses Lane, Sheffield; Mrs. A. G. Yeomans, 111, Millhouses Lane, Sheffield. Qual. of dirs.: One share. Remun. of dirs.: As voted by the company.

Holborn Produce, Limited. (331320.) Registered September 4, 1937. To carry on bus. as tomato, fruit, vegetable and genl. produce growers, etc. Nom. Cap.: £1,000 in £1 shares. Dirs.: F. C. T. Lane, 50, Clare Lawn Avenue, East Sheen, S.W. 14 (ch.); J. C. Aleman, 22, Granville Park, Lewisham, S.E. Remun. of dirs.: As voted by the company.

Geo. Isles, Junr., Limited. (331442.) Registered September 9, 1937. Spitalfields Market, E. 1. To take over the bus. of a potato and vegetable salesman cd. on by G. Isles at Spitalfields Market, E. Nom. Cap.: £3,000 in £1 shares. Dirs.: G. Isles, Orplands Farm, Bradwell-on-Sea, Essex (permt. gov. dir.); Mrs. M. A. Isles, Orplands Farm, Bradwell-on-Sea; J. A. Isles, Byhams Farm, Tillingham, Essex.

James Marzetti and Sons, Limited. (331323.) Registered September 4, 1937. To take over the bus. of a caterer and baker cd. on by J. Marzetti at 42 and 43, Harbour Parade, Ramsgate. Nom. Cap.: £2,000 in £1 shares. Dirs.: J. Marzetti, The Popular Hotel, Harbour Parade, Ramsgate (permt.); J. C. Marzetti, The Popular Hotel, Harbour Parade, Ramsgate; A. C. Marzetti, The Popular Hotel, Harbour Parade, Ramsgate. Qual. of dirs.: £10 ord. shares. Remun. of dirs.: £150 each per annum (ch. £200).

Murray Davidson and Company, Limited. (331359.) Registered September 6, 1937.

To carry on the bus. of provision mchts. and caterers, etc. Nom. Cap.: £50,000 in £1 shares. Dirs.: To be appointed by the subs. Subs.: P. M. Browne, 2, Bond Court, Walbrook, E.C. 4 (clk.); E. Domone, 2, Bond Court, Walbrook, E.C. 4 (clk.).

Notts Fruit Stores, Limited. (331383.) Registered September 7, 1937. Britannic House, 53, Mansfield Road, Nottingham. To carry on bus. as fruit, potato and vegetable growers and mchts., etc. Nom. Cap.: £500 in £1 shares. Dirs.: W. C. G. Roe, 17, Greys Road, Woodthorpe, Nottingham; A. E. Cramp, Farndale, Bardon Road, Coalville. Qual. of dirs.: £50 shares. Remun. of dirs.: As voted by the company.

Palatine Packing Company, Limited. (331361.) Registered September 6, 1937. 41, Mersey Street, Liverpool. To carry on the bus. of packers, mixers, storers and/or mnfrs. of flours, custard powders, cake mixtures, etc. Nom. Cap.: £10,000 in £1 shares (4,000 ord. and 6,000 pref.). Dirs.: J. E. Dixon, Thornton Hey, Far Moss Road, Blundellsands, Lancs; H. A. Thomas, Rivington Road, Hale, Ches.; H. F. Higson, 281, St. Helens Road, Bolton.

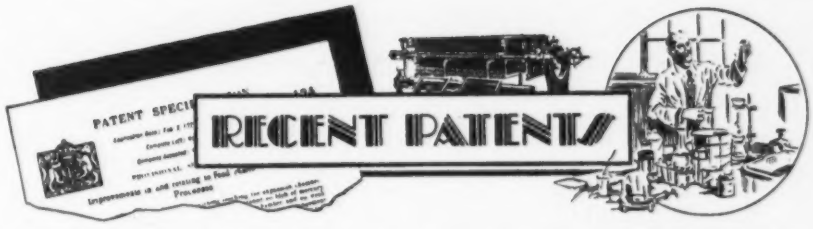
Powell, Harvey and Company, Limited. (331457.) Registered September 9, 1937. To take over the bus. of wholesale fruiterers and greengrocers cd. on at 12, Welsh Back, Bristol, as "Powell, Harvey and Co." Nom. Cap.: £2,500 in £1 shares (1,500 ord. and 1,000 pref.). Dirs.: J. Powell, 10, Melita Road, Bristol (ch.); F. C. Powell, 10, Melita Road, Bristol; J. B. Jones, 8, Priory Road, Knowle, Bristol. Qual. of dirs.: Ten ord. shares.

Savoy Wine Stores (1937), Limited. (331365.) Registered September 6, 1937. To carry on the bus. of grocers, provision mchts., licensed victuallers, wine and spirit mchts. Nom. Cap.: £500 in £1 shares. Dirs.: To be appointed by the subs. Remun. of dirs.: As voted by the company. Subs.: H. H. Corke, 12, Pendennis Road, West Green, N. 17 (clk.); A. L. Hollingbery, 57, Christie Road, E. 9 (clk.).

John A. Stokdyk, Limited. (331288.) Registered September 3, 1937. 15, King Street, Covent Garden, W.C. 2. To carry on the bus. of fruit and vegetable mchts., etc. Nom. Cap.: £4,000 in £1 shares (2,000 pref. and 2,000 ord.). Dirs.: J. A. Stokdyk, 19, New Street, Covent Garden, W.C. 2; A. R. Kreule, Sussex House, Richmond, Surrey. Qual. of dirs.: £250 shares. Remun. of dirs.: As voted by the company.

Woods Farm (East Hendred), Limited. (331421.) Registered September 8, 1937. To carry on the bus. of farmers, millers and corn mchts., etc. Nom. Cap.: £2,000 in £1 shares. Dirs.: Not named. Qual. of dirs.: £100 shares. Subs.: B. S. Mayhead, West Lodge, Milton Hill, Berks; E. G. Ballard, 21, Bath Street, Abingdon.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

21675. BAILEY, A., BAILEY, W. H.: Apparatus for fryer's scraps. August 6.
21769. SMITH, M. C.: Safeguarding of food against ants. August 7.
21793. HOPKINS, A. D., HOPKINS AND SONS, LTD., G.: Pasteurising, etc., apparatus. August 7.
22231. BAKER PERKINS, LTD.: Stacking, etc., of baked biscuits, etc. August 12.
22370. BAKER PERKINS, LTD.: Transportation of goods from chocolate coating, etc., machines.
22379. EDISBURY, J. R., MORTON, R. A.: Preparation of fat-soluble vitamins. August 14.
22431. SCHWINGER, H.: Machines for dividing up slabs of sugar, etc. August 16.
22433. GRANT, A., MACNAUGHTON, D.: Meat, etc., mincing machines. August 16.
22490. MUSHER FOUNDATION, INC.: Treatment of dairy products. August 16.
22764. DUNLOP, S. (FIORATOS): Drying of grain, etc.
22765, 23198. HADDAN, R. (KELCO CO.): Manufacture of ice-cream, etc.
22882. HENRY, M. G.: Drip-preventing, etc., devices for bottles, etc.
22909. BERWICK, A. G.: Devices for delivering measured quantities of liquid.
23094. JOHNSON, G. W. (I.G. FARBENINDUSTRIE AKT.-GES.): Process of improving the properties of vegetable, etc., materials.
23181. BROOK, L.: Knife mechanism for wrapping-machines.
23274. STRAUSSLER, N.: Mouldings of articles in rubber, etc.
23321. STEVENS, A. H. (STALEY MANUFACTURING CO.): Production of fondant material, etc.

Complete Specifications Accepted

469,767. FAIRWEATHER, F. W.: Hot-air drying and/or curing apparatus.
469,771. MILLER, J.: Sugar-crystallising and like apparatus.
470,031. JESSOP, J. A.: Process for the manufacture of a sugar composition.
470,045. EZAKI, S.: Manufacture of cocoa substitutes.
470,169. STEVENS, A. H. (ROCKWOOD AND CO.): Manufacture of chocolate.
470,173. VICKERS, H.: Method of preserving foodstuffs in sealed containers.
470,508. VITABANA SOC. ANON.: Preparation and preservation of vitamin-containing foods. (February 21, 1935.)
470,509. VITABANA SOC. ANON.: Preparation of banana flour. (November 28, 1935.)
470,753. SCOTT, R.: Jam and marmalade. (January 22, 1935.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

465,423. **Homogenisation of cream.** WILLMANN, J., 570, Rutherford Avenue, Charlestown, Mass., U.S.A.
A cream-homogenisation process is described in which a low pressure of the order of 100 to 300 lb. per square inch is applied and the cream then tempered by gradually heating to between 65° to 95° F. to increase the viscosity to the desired degree. The original body can thus be restored while the homogenised product is substantially permanent against later mechanical agitation from handling, etc., and does not separate when added to hot coffee and the like. Its whipping qualities are not altered.

466,882. **Treating oil seeds; food preparations.** STANDARD BRANDS, INC.
Oil and an enzyme-containing flour are prepared from oil-bearing seeds, beans and the like by extracting the oil from the seeds, etc., with a solvent, removing the solvent containing the oil by pressure, drying the residue and grinding it to flour, the temperature throughout the treatment being below the decomposition temperature of the enzymes in the original material, and in any case below 70° C. The material—*e.g.*, comminuted soy beans—is admixed with a solvent—*e.g.*, ethyl acetate—in an amount sufficient thoroughly to wet the meal—*e.g.*, an amount equal to the volume of the meal—the temperature being maintained below 50° C., and preferably at 30° to 40° C. The solvent-treated meal is then freed from the solvent by subjecting to pressure—*e.g.*, a pressure of 5,000 lb. to 15,000 lb. per square inch (*e.g.*, in a filter press). Before the application of pressure, part of the solvent may be removed by filtration or centrifuging. After pressing, the residue is dried at a temperature of below 50° C. and ground to flour. The solvent is separated from the oil by distillation. Other solvents specified are acetone, benzene and petroleum ether.

LATEST TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

ADDISWOOD.—578,799. **Substances used as food or as ingredients in food.** ADDIS AND USHERWOOD, LTD., 37, King William Street, Greenwich, London, S.E. 10. August 25.

AL-E-CO.—577,950. **Table vinegar.** JOHN HERBERT, Hamilton House, Ribbleton, Preston. August 25.

BARONIAL.—579,097. **Cheese and cheese products (for food).** KRAFT CHEESE COMPANY, LTD., Silverdale Road, Hayes, Middlesex. September 1.

BLUE CHECK. — B 571,554. **Canned peaches, canned pears and canned apricots.** SUTTER PACKING COMPANY, 300, Portage Street, Palo Alto, California, United States of America. August 18.

User claimed from January 2, 1929.

BRAEMORE.—573,341. **Cheddar cheese.** SWIFT AND CO., LTD., 58, West Smithfield, London, E.C. 1. September 1.

Registration of this trade mark shall give no right to the exclusive use of the word "Braemore".

CATCH CROP.—579,096. **Cheese and cheese products (for food).** KRAFT CHEESE COMPANY, LTD., Silverdale Road, Hayes, Middlesex. September 1.

CHICKEN JOE.—578,755. **Chickens (for food).** JOSEPH BARAK, trading as Chicken Joe, 77, Rhodeswell Road, London, E. 14.

CITY BAKERIES. — 578,599. **Bread, cakes, tarts, biscuits and confectionery.** THE CITY BAKERIES, LTD., 15-37, Clarendon Street, St. George's Cross, Glasgow. September 8.

Registration of this trade mark shall give no right to the exclusive use of the words "City Bakeries".

CORONA.—573,543. **Eggs (for use as food).** MORRIS ISRAEL AND SONS, LTD., 75, New Road, London, E. 1. August 25.

DESERT SONG. — 578,630. **Fruits and vegetables (for food).** OLIVIER KERBIRIOU (LONDON), LTD., 3 and 4, King Street, Covent Garden, London, W.C. 2. August 25.

EUROTOP. — 578,491. **Flour.** CHELSEA FOOD PRODUCTS, LTD., Chelsea Wharf, Lot's Road, Chelsea, London, S.W. 10. August 25.

FRIAR BRAND. — 575,352. **Substances used as food or as ingredients in food, but not including honey, cheese, lard, butter, milk, cream sweetmeats, confectionery or chocolates, and not including any goods of the same description as any of these excluded goods.** HARRY GLANVILLE PIGOTT, trading as H. Pigott AND SON, 104 and 105, Friar Street, Reading. (By Consent.) August 18.

GINGESTA. — 577,313. **Biscuits.** PEEK, FREAN AND CO., LTD., 158, Drummond Road, Bermondsey, London, S.E. 16. (By Consent.) August 18.

GRAND DUKE.—578,945. **Confectionery.** ELIZABETH JANE TOPORKOFF, trading as E. J. Topp, 41, Gwendwr Road, London, W. 14. September 1.

JETMAR. — 578,745. **Eggs for food.** UNITED EGG DISTRIBUTORS, LTD., 74, Fulham Road, London, S.W. 7. September 1.

JUDITH.—579,124. **Sardines.** ABRAHAM NATHANIEL LEVY, trading as M. De J. Levy and Sons, 110, Fenchurch Street, London, E.C. 3. September 8.

LITTLE IMPS.—578,776. **Canned fruit, canned vegetables, canned meat, canned fish and canned milk.** GARDNER, TITLEY AND WIDGERY, LTD., 14, 15 and 16, Queen Square, Bristol. (Associated.) September 8.

MELAVIT.—578,038. **Honey and mixtures of honey and invert sugar for use as food.** THE BEAR HONEY CO., LTD., Garvin House, Twickenham Road, Isleworth, Middlesex. September 1.

NEON.—578,918. **Chocolate and confectionery.** JOHN MACINTOSH AND SONS, LTD., Albion Mills, Waterside, Halifax, Yorkshire. September 8.

PANOMALT. — 576,587. **Substances containing malt, for use as food.** H. A. AND D. TAYLOR, LTD., The Maltings, Sawbridgeworth, Hertfordshire. August 18.

SEFT.—577,711. **Oils and fats for cooking, frying and cake making.** A. BELLAMY AND CO., LTD., 51, Bendon Valley, London, S.W. 18. August 25.

RAYGLO.—576,469. **Substances used as food or as ingredients in food, but not including preparations in solid form for making fruit or the like beverages, and not including any goods of the same description as any of these excluded goods.** CUPAL, LTD., Phœnix Mill, King Street Bridge, Blackburn. (Associated.) September 8.

SARSAX.—577,945. **Beverages (not alcoholic, not aerated and not medicated) and flavourings (not alcoholic, not aerated and not medicated) for beverages.** POTTER AND CLARKE, LTD., 60, 62 and 64, Artillery Lane, London, E. 1. (Associated.) September 1.

SNOWBOY.—578,435. **Flour.** CHELSEA FOOD PRODUCTS, LTD., Chelsea Wharf, Lot's Road, Chelsea, London, S.W. 10. September 8.

THE PIER HEAD.—577,735. **Edible oils and edible fats and oils and fats for cooking.** MERSEYSIDE FOOD PRODUCTS, LTD., 51, North John Street, Liverpool, Lancashire. September 1.

TYLANDO.—578,796. **Substances used as food or as ingredients in food, but not including tea.** ROBERT JOHN NEWMAN GRAY, Greycroft, Hallow Road, Worcester. (Associated.) September 1.

570,243.—**Cheese, evaporated milk, condensed milk, powdered milk (for food), powdered buttermilk (for food) and butter.** CONSOLIDATED DAIRY PRODUCTS COMPANY, 635, Elliott Avenue West, Seattle, Washington, United States of America. June 30.

577,909.—**Substances used as food or as ingredients in food, but not including species of glacé and crystallised cherries.** PRODUCE IMPORTERS (ALLIANCE), LTD., Argyle House, Euston Road, London, N.W. 1. August 18.

Registration No. 558,145 (2982) will be cancelled if and before the applicants' mark is registered.